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TARGA

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www.targaresources.com

May 14, 2018 FEDEX TRACKING NUMBER: 0201 7722 2833 8010

Noreen Okubo
Part 71 Operating Permits Lead
Air Program, 8P-AR
US EPA Region 8
1595 Wynkoop Street
Denver, CO 80202

RE: Federal Operating Permit Application Modification
Targa Badlands LLC
Clark's Creek Compressor Station
McKenzie County, North Dakota

Ms. Okubo,

Targa Badlands LLC (Targa) has constructed the Three Affiliated Tribes (TAT) – Blue Buttes Compressor Station, a natural gas compressor station located within the exterior bounds of the Fort Berthold Indian Reservation in McKenzie County, North Dakota. Targa submitted a Part 1 application to EPA Region 8 on June 30, 2017 in order to register the facility under the Federal Implementation Plan (FIP) for True Minor Oil and Gas Sources per the requirements of Title 40 of the Code of Federal Regulations (40 CFR) Part 49. Targa is herein submitting the required Part 2 information to register the TAT – Blue Buttes Compressor Station.

The equipment installed at the TAT – Blue Buttes Compressor Station includes the following:

- Six compressor engines (EU 1, EU 2, EU 3, EU 4, EU 5, and EU 6);
- One produced water tank (EU 7) and its associated loading (EU 8);
- Various PIG launchers and receivers (EU 9);
- Two condensate tanks (EU 11 and EU 12) and their associated loading (EU 13);
- One vapor combustor (EU 14);
- One glycol dehydrator (EU 15);
- One glycol reboiler (EU 16);
- One methanol storage tank (EU 17);
- Six lube oil tanks (EU 18, EU 19, EU 20, EU 21, EU 22, and EU 23);
- Two antifreeze tanks (EU 24 and EU 25);
- One triethylene glycol tank (EU 26);
- Two generator engines (EU 27 and EU 28); and
- Fugitive emissions associated with equipment leak components (EU 10).

We appreciate your assistance with this FIP Registration. If you have any questions or comments about the information presented in this letter, please do not hesitate to contact me at (405) 749-5614 or cschroder@targaresources.com.

Sincerely,
Targa Badlands LLC

Catherine Schroder

Catherine Schroder
Senior Environmental Specialist

cc: Mr. Charles Bates, Targa Badlands LLC
Ms. Shelley Koehn, Trinity Consultants Inc.
Mr. Colin Schwartz
Ms. Claudia Smith

TRUE MINOR OIL AND GAS SOURCE REGISTRATION
FEDERAL IMPLEMENTATION PLAN – PART 2

Targa Badlands LLC > TAT - Blue Buttes Compressor Station

TARGA

TARGA BADLANDS LLC

811 Louisiana Street, Suite 2100
Houston, TX 77002-1400

Prepared By:

TRINITY CONSULTANTS
7300 Hudson Boulevard North, Suite 240
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(651) 275-9900
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May 2018

Project 172401.0034

Trinity Consultants

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LIST OF TABLES

Targa Badlands LLC (Targa) is herein submitting the required information to register the proposed Three Affiliated Tribes (TAT) – Blue Buttes Compressor Station (the facility) under the Federal Implementation Plan (FIP) for True Minor Oil and Gas Sources per the requirements of Title 40 of the Code of Federal Regulations (40 CFR) Part 49. Under §49.152(d), true minor source means a source, not including the exempt emissions units and activities listed in §49.153(c), that emits, or has the potential to emit, regulated New Source Review (NSR) pollutants in amounts that are less than the major source thresholds in §49.167 or §52.21, as applicable, but equal to or greater than the minor NSR thresholds in §49.153, without the need to take an enforceable restriction to reduce its potential to emit to such levels. The facility will be a true minor source that is located within the exterior bounds of the Fort Berthold Indian Reservation. This is the initial new true minor source registration under 40 CFR Part 49 for the site.

Targa has installed the following emission units at the facility:

- Six compressor engines (EU 1, EU 2, EU 3, EU 4, EU 5, and EU 6);
- One produced water tank (EU 7) and its associated loading (EU 8);
- Various PIG launchers and receivers (EU 9);
- Two condensate tanks (EU 11 and EU 12) and their associated loading (EU 13);
- One vapor combustor (EU 14);
- One glycol dehydrator (EU 15);
- One glycol reboiler (EU 16);
- One methanol storage tank (EU 17);
- Six lube oil tanks (EU 18, EU 19, EU 20, EU 21, EU 22, and EU 23);
- Two antifreeze tanks (EU 24 and EU 25);
- One triethylene glycol tank (EU 26);
- Two generator engines (EU 27 and EU 28); and
- Fugitive emissions associated with equipment leak components (EU 10).

This application satisfies the requirements to submit the Part 2 information. Appendix A includes the Part 2 application form, Appendix B includes the potential to emit calculations for the site, and Appendix C includes vendor specification sheets.

1.1. GENERAL APPLICANT INFORMATION

Listed below are the points of contact for the registration application. The Part 2 form, included in Appendix A, also provides this information.

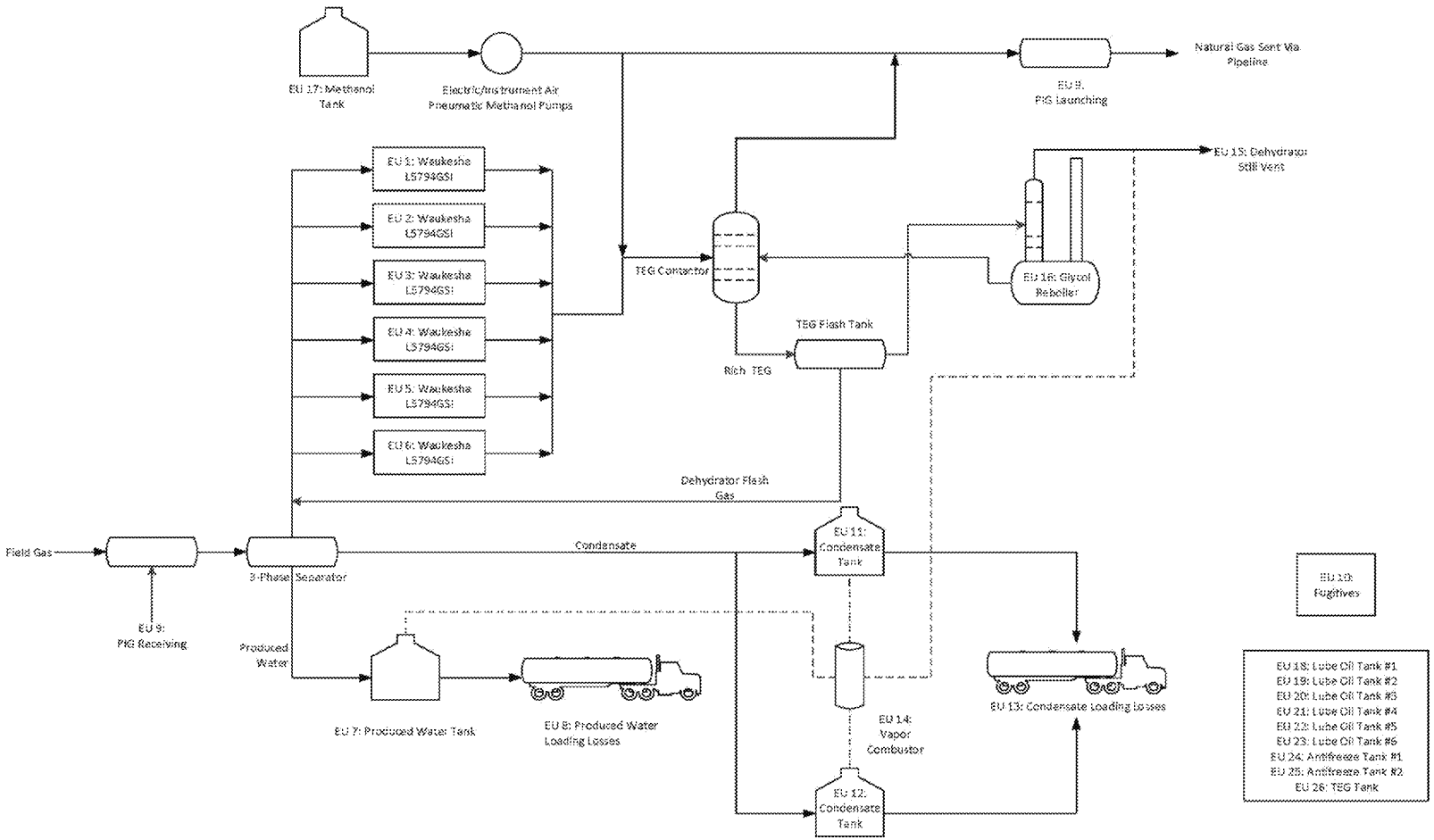
Project Site: Targa Badlands LLC – TAT – Blue Buttes Compressor Station
NW ¼, NE ¼, S31, T151N, R94W
McKenzie County, North Dakota

Applicant Contact: Catherine Schroder
Senior Environmental Specialist
Targa Badlands LLC
14000 Quail Springs Parkway Suite 215
Oklahoma City, Oklahoma 73134
(405) 749-5614

2.1. DESCRIPTION OF OPERATIONS

Inlet gas flows from gas lines to a 3-phase separator, where liquids are gravimetrically separated. Produced water and condensate are directed to the produced water and condensate tanks, respectively, and trucked from the facility. Both the produced water and condensate tanks are controlled by a vapor combustor. The overhead gas is compressed and dehydrated before being discharged to the gathering pipeline. The rich glycol is first directed to a flash tank to remove entrained hydrocarbons before being sent to the glycol reboiler. The glycol reboiler vapor stream is directed to the same vapor combustor as the tanks, but can also vent to the atmosphere. Methanol is injected at different points in the process using pneumatic pumps to prevent hydrates from forming; however, as these pneumatic pumps will be either instrument air or electric, they will not have emissions, and thus are not discussed further in this application. Similarly, the pneumatic controllers onsite will be instrument air and the tank heaters will be electric; these units will also have no emissions, and will not be discussed further in this application. Generator engines provide power to the facility. A process flow diagram is presented in Section 2-2.

2.2. PROCESS FLOW DIAGRAM



2.3. IDENTIFICATION OF EMISSION UNITS

Table 2-1 includes a complete list of the emission units and their ratings at the facility, as well as the associated Emission Unit ID (EU) and Emission Point Number (EPN) for each unit.

Table 2-1. Emission Unit Summary

Emission Unit ID	Emission Point ID	Description	Capacity/Rating
1	1	Waukesha L5794GSI Compressor Engine	1,380 hp
2	2	Waukesha L5794GSI Compressor Engine	1,380 hp
3	3	Waukesha L5794GSI Compressor Engine	1,380 hp
4	4	Waukesha L5794GSI Compressor Engine	1,380 hp
5	5	Waukesha L5794GSI Compressor Engine	1,380 hp
6	6	Waukesha L5794GSI Compressor Engine	1,380 hp
7	14	Produced Water Tank	400 bbl
8	8	Produced Water Loading Losses	82.20 bbl/day
9	9	PIG Launchers/Receivers	-
10	10	Fugitive Emissions	-
11	14	Condensate Tank #1	400 bbl
12	14	Condensate Tank #2	400 bbl
13	13	Condensate Loading Losses	255.00 bbl/day
14	14	Vapor Combustor	-
15	15	Dehy Process Vents	36 MMscfd
16	16	Glycol Reboiler	0.675 MMBtu/hr
17	17	Methanol Storage Tank	2,000 gal
18	18	Lube Oil Tank #1	500 gal
19	19	Lube Oil Tank #2	500 gal
20	20	Lube Oil Tank #3	500 gal
21	21	Lube Oil Tank #4	500 gal
22	22	Lube Oil Tank #5	500 gal
23	23	Lube Oil Tank #6	500 gal
24	24	Antifreeze Tank #1	500 gal
25	25	Antifreeze Tank #2	500 gal
26	26	TEG Tank	500 gal
27	27	Doosan PSI HD Generator Engine	507 hp
28	28	Doosan PSI HD Generator Engine	507 hp

2.4. AIR POLLUTION CONTROLS

Targa has installed the following control devices at the facility. Section 4 outlines the underlying regulatory requirements for these control devices.

- Each compressor engine (EU 1, EU 2, EU 3, EU 4, EU 5, and EU 6) is equipped with a catalytic converter as required by NSPS JJJJ. Additional information is included in Section 4.3.2.
- A vapor combustor (EU 14) controls VOC and HAP emissions from the two condensate tanks (EU 11 and EU 12) as required by NSPS OOOOa. The produced water tank and glycol reboiler still vent also vent to this vapor combustor; however, as Targa has implemented this control voluntarily and there is no underlying regulation requiring this control, these emission units are being treated as uncontrolled. Additional information is included in Section 4.3.4.

All other equipment onsite is uncontrolled.

2.5. COMPLIANCE MONITORING DEVICES/ACTIVITIES

In order to demonstrate compliance with applicable FIP requirements, Targa will perform applicable monitoring and testing per applicable NSPS and/or MACT regulations contained in the FIP. For sources that are not subject to any monitoring and testing requirements in the NSPS and/or MACT regulations, Targa will utilize industry best management practices and will maintain and operate site equipment per manufacturer recommendations to minimize air emissions.

3.1. EXPECTED ACTUAL OPERATING SCHEDULE

Targa anticipates the facility will operate 24 hours per day, 7 days per week, and 52 weeks per year (8,760 hours per year). Operation of the new equipment began on December 6, 2017. Table 3-1 provides the projected actual material usage and production rates for the site based on actual throughputs and fuel usage since the commencement of operations. However, as the initial operations of the site may not represent optimal or normal rates, Targa has used maximum design criteria and throughput rates to calculate the projected actual emissions rather than the values in Table 3-1. As such, Targa has conservatively assumed that the actual emissions for the facility are equal to the potential to emit for the facility.

Table 3-1. Anticipated Actual Material Usage and Production Rates

Material Type	Annual Usage
Condensate	86,688 bbl/year
Produced Water	20,106 bbl/year
Methanol	38,040 gal/year
Inlet Natural Gas	5,453 MMscf/year
Discharge Natural Gas	4,808 MMscf/year
Fuel Natural Gas	245 MMscf/year

The facility does not use any raw materials.

3.2. EMISSION CALCULATION METHODOLOGY

This section addresses the basis for the emission calculations for each emission unit at the facility. The pollutants that are evaluated for the emission units include nitrogen oxides (NO_x), carbon monoxide (CO), volatile organic compounds (VOC), sulfur dioxide (SO_2), particulate matter with an aerodynamic diameter of less than 10 microns (PM_{10}) and less than 2.5 microns ($PM_{2.5}$), and hazardous air pollutants (HAPs). Each emission unit description also includes a unit identification number for cross-referencing with the attached emission calculation worksheets included in Appendix B. Tables 3-2 and 3-3 include the potential to emit summary for criteria pollutants and hazardous air pollutants, respectively.

Targa has grouped similar emission units together for simplicity, and has outlined emissions for the following emission units and groups:

- Natural Gas-Fired Reciprocating Internal Combustion Engines;
- Storage Tanks;
- Loading Losses;
- Pigging Operations;
- Fugitive Emissions;
- Glycol Dehydrator;
- Natural-Gas Fired Heaters; and
- Vapor Combustor.

Table 3-2. Potential to Emit – Criteria Pollutants

EU	EPN	Equipment Description	Design Rating	Criteria Pollutant Emissions (tpy)					
				NO_x	CO	VOC	SO_2	PM_{10}	$PM_{2.5}$
EU 1	EPN 1	Waukesha L5794GSI	1,380 hp	13.33	26.65	9.99	0.03	0.99	0.99
EU 2	EPN 2	Waukesha L5794GSI	1,380 hp	13.33	26.65	9.99	0.03	0.99	0.99
EU 3	EPN 3	Waukesha L5794GSI	1,380 hp	13.33	26.65	9.99	0.03	0.99	0.99
EU 4	EPN 4	Waukesha L5794GSI	1,380 hp	13.33	26.65	9.99	0.03	0.99	0.99
EU 5	EPN 5	Waukesha L5794GSI	1,380 hp	13.33	26.65	9.99	0.03	0.99	0.99
EU 6	EPN 6	Waukesha L5794GSI	1,380 hp	13.33	26.65	9.99	0.03	0.99	0.99
EU 7	EPN 7	Produced Water Tank	400 bbl	-	-	-	-	-	-
EU 8	EPN 8	Produced Water Loading Losses	82.20 bbl/day	-	-	0.12	-	-	-
EU 9	EPN 9	PIG Launchers/Receivers	-	-	-	0.51	-	-	-
EU 10	EPN 10	Fugitive Emissions	-	-	-	29.60	-	-	-
EU 11	EPN 14	Condensate Tank #1 [1]	400 bbl	-	-	-	-	-	-
EU 12	EPN 14	Condensate Tank #2 [1]	400 bbl	-	-	-	-	-	-
EU 13	EPN 13	Condensate Loading Losses	255 bbl/day	-	-	16.94	-	-	-
EU 14	EPN 14	Vapor Combustor [1]	-	0.05	0.22	2.01	1.09E-04	-	-
EU 15	EPN 15	Dehy Process Vents	36 MMscfd	-	-	29.90	-	-	-
EU 16	EPN 16	Glycol Reboiler	0.675 MMBtu/hr	0.29	0.24	0.02	1.74E-03	0.02	0.02
EU 17	EPN 17	Methanol Storage Tank	2,000 gal	-	-	0.02	-	-	-
EU 18	EPN 18	Lube Oil Tank #1	500 gal	-	-	1.00E-03	-	-	-
EU 19	EPN 19	Lube Oil Tank #2	500 gal	-	-	1.00E-03	-	-	-
EU 20	EPN 20	Lube Oil Tank #3	500 gal	-	-	1.00E-03	-	-	-
EU 21	EPN 21	Lube Oil Tank #4	500 gal	-	-	1.00E-03	-	-	-
EU 22	EPN 22	Lube Oil Tank #5	500 gal	-	-	1.00E-03	-	-	-
EU 23	EPN 23	Lube Oil Tank #6	500 gal	-	-	1.00E-03	-	-	-
EU 24	EPN 24	Antifreeze Tank #1	500 gal	-	-	1.00E-03	-	-	-
EU 25	EPN 25	Antifreeze Tank #2	500 gal	-	-	1.00E-03	-	-	-
EU 26	EPN 26	TEG Tank	500 gal	-	-	1.00E-03	-	-	-
EU 27	EPN 27	Doosan/PSI FPSIB21.9NGP	507 hp	4.90	9.79	3.78	0.01	0.33	0.33
EU 28	EPN 28	Doosan/PSI FPSIB21.9NGP	507 hp	4.90	9.79	3.78	0.01	0.33	0.33
Facility Total				**90.08**	**179.95**	**146.64**	**0.20**	**6.64**	**6.64**
Part 71 Potential to Emit Total [2]				**90.08**	**179.95**	**117.04**	**0.20**	**6.64**	**6.64**

1. Emissions from the two condensate tanks and one produced water tank are routed through the Vapor Combustor, and are thus included in the vapor combustor emission totals.

2. Part 71 Potential to Emit Total does not include fugitive criteria pollutant emissions, as fugitive non-HAP emissions are not included in major source applicability.

Table 3-3. Potential to Emit – Hazardous Air Pollutants

EU	EPN	Equipment Description	HAP Emissions (tpy)										
			Acetalde-hyde	Acrolein	n-Hexane	Benzene	Toluene	Ethyl-benzene	Xylenes	2,2,4-TMP	CH_2O	Methanol	Total HAP
EU 1	EPN 1	Waukesha L5794GSI	0.14	0.13	-	0.08	0.03	1.27E-03	9.97E-03	-	0.67	0.16	1.28
EU 2	EPN 2	Waukesha L5794GSI	0.14	0.13	-	0.08	0.03	1.27E-03	9.97E-03	-	0.67	0.16	1.28
EU 3	EPN 3	Waukesha L5794GSI	0.14	0.13	-	0.08	0.03	1.27E-03	9.97E-03	-	0.67	0.16	1.28
EU 4	EPN 4	Waukesha L5794GSI	0.14	0.13	-	0.08	0.03	1.27E-03	9.97E-03	-	0.67	0.16	1.28
EU 5	EPN 5	Waukesha L5794GSI	0.14	0.13	-	0.08	0.03	1.27E-03	9.97E-03	-	0.67	0.16	1.28
EU 6	EPN 6	Waukesha L5794GSI	0.14	0.13	-	0.08	0.03	1.27E-03	9.97E-03	-	0.67	0.16	1.28
EU 7	EPN 7	Produced Water Tank	-	-	-	-	-	-	-	-	-	-	-
EU 8	EPN 8	Produced Water Loading Losses	-	-	2.25E-03	1.72E-04	1.39E-04	1.10E-05	1.81E-05	1.09E-04	-	-	2.70E-03
EU 9	EPN 9	PIG Launchers/Receivers	-	-	2.71E-03	-	1.42E-04	-	1.63E-04	6.14E-04	-	-	3.63E-03
EU 10	EPN 10	Fugitive Emissions	-	-	1.69	0.12	0.39	0.11	0.19	0.28	-	0.67	3.44
EU 11	EPN 14	Condensate Tank #1 [1]	-	-	-	-	-	-	-	-	-	-	-
EU 12	EPN 14	Condensate Tank #2 [1]	-	-	-	-	-	-	-	-	-	-	-
EU 13	EPN 13	Condensate Loading Losses	-	-	0.32	0.02	0.02	1.59E-03	2.61E-03	0.02	-	-	0.39
EU 14	EPN 14	Vapor Combustor [1]	-	-	0.13	8.88E-03	0.02	6.31E-03	0.01	0.02	3.34E-05	-	0.20
EU 15	EPN 15	Dehy Process Vents	-	-	0.50	-	1.54	-	2.99	-	-	-	5.03
EU 16	EPN 16	Glycol Reboiler	-	-	5.22E-03	6.09E-06	9.86E-06	-	-	-	2.17E-04	-	5.46E-03
EU 17	EPN 17	Methanol Storage Tank	-	-	-	-	-	-	-	-	-	0.02	0.02
EU 18	EPN 18	Lube Oil Tank #1	-	-	-	-	-	-	-	-	-	-	1.00E-03

EU 19	EPN 19	Lube Oil Tank #2	-	-	-	-	-	-	-	-	-	-	1.00E-03
EU 20	EPN 20	Lube Oil Tank #3	-	-	-	-	-	-	-	-	-	-	1.00E-03
EU 21	EPN 21	Lube Oil Tank #4	-	-	-	-	-	-	-	-	-	-	1.00E-03
EU 22	EPN 22	Lube Oil Tank #5	-	-	-	-	-	-	-	-	-	-	1.00E-03
EU 23	EPN 23	Lube Oil Tank #6	-	-	-	-	-	-	-	-	-	-	1.00E-03
EU 24	EPN 24	Antifreeze Tank #1	-	-	-	-	-	-	-	-	-	-	1.00E-03
EU 25	EPN 25	Antifreeze Tank #2	-	-	-	-	-	-	-	-	-	-	1.00E-03
EU 26	EPN 26	TEG Tank	-	-	-	-	-	-	-	-	-	-	1.00E-03
EU 27	EPN 27	Doosan/PSI FPSIB21.9NGP	0.05	0.05	-	0.03	0.01	4.25E-04	3.34E-03	-	0.35	0.05	0.56
EU 28	EPN 28	Doosan/PSI FPSIB21.9NGP	0.05	0.05	-	0.03	0.01	4.25E-04	3.34E-03	-	0.35	0.05	0.56
Facility Total			**0.95**	**0.90**	**2.66**	**0.69**	**2.16**	**0.12**	**3.26**	**0.31**	**4.70**	**1.73**	**17.87**

11. Emissions from the two condensate tanks and one produced water tank are routed through the Vapor Combustor, and are thus included in the vapor combustor emission totals..

3.2.1. Natural Gas-Fired Reciprocating Internal Combustion Engines

There are eight (8) natural gas-fired engines at the facility – EU 1, EU 2, EU 3, EU 4, EU 5, EU 6, EU 27, and EU 28. Each of these engines are four-stroke rich burn (4SRB) engines. The facility uses EU 1 through EU 6 to compress natural gas, and EU 27 and EU 28 for power generation.

Engines EU 1 through EU 6 are Waukesha L5794GSI model engines, rated at 1,380 bhp. As noted in Section 4.3.2, each engine is subject to NSPS JJJJ, and thus is equipped with a catalytic converter in order to meet the federally enforceable limits for NO_x, CO, and VOC as listed in Table 1 of NSPS JJJJ. Appendix D contains the specification sheets for both the engine and the catalytic converter. Targa calculated emissions for NO_x, CO, and VOC using the limits from NSPS JJJJ. The catalytic converter is also expected to control formaldehyde; however, as there is no federally enforceable limit in NSPS JJJJ for formaldehyde, Targa did not claim controls for formaldehyde and calculated formaldehyde emissions using the emission factor from the manufacturer specification sheet. As the VOC limit in NSPS JJJJ does not include formaldehyde, Targa combined the VOC emission factor from NSPS JJJJ and the manufacturer's emission factor for formaldehyde to calculate total VOC emissions. Targa calculated emissions for all other criteria pollutant and HAPs using emission factors from AP-42, Section 3.2 – Natural Gas-Fired Reciprocating Engines, Table 3.2-3 (7/00). Both potential and actual emissions assume 8,760 hours of operation.

Engines EU 27 and EU 28 are Doosan/PSI 21.9L model engines, rated at 507 bhp. As outlined in Section 4.3.2, these units are both certified engines under NSPS JJJJ; however, Targa is operating these engines as non-certified. Appendix D contains the specification sheet for these engines, as well as the NSPS JJJJ certification. Similar to engines EU 1 through EU 6, Targa calculated NO_x, CO, and VOC emissions using the federally enforceable limits in NSPS JJJJ. The specification sheet for the engines did not list any emission factors, thus Targa calculated emissions for all other criteria pollutant and HAPs, including formaldehyde, using emission factors from AP-42, Section 3.2 – Natural Gas-Fired Reciprocating Engines, Table 3.2-3 (7/00). Both potential and actual emissions assume 8,760 hours of operation. As the VOC limit in NSPS JJJJ does not include formaldehyde, Targa combined the VOC emission factor from NSPS JJJJ and the manufacturer's emission factor for formaldehyde to calculate total VOC emissions.

3.2.2. Storage Tanks

The facility includes the following storage tanks: one (1) produced water tank, two (2) condensate tanks, one (1) methanol tank, six (6) lube oil tanks, two (2) antifreeze tanks, and one (1) triethylene glycol (TEG) tank.

The produced water tank (EU 7) and condensate tanks (EU 11, EU 12) will have working, breathing, and flash emissions. Targa used ProMax 4.0 to predict emissions from both the produced water and condensate tanks. The program uses the Peng-Robinson equation of state to predict flashing emissions and the equations of AP-42 Section 7.1 – Organic Liquid Storage Tanks (11/06) to predict working and standing losses. The ProMax file assumes 1% of the condensate is sent to the produced water tank. The output file from the ProMax run can be found in Appendix B.

The methanol tank (EU 10) will also have working and breathing losses. These losses were calculated using the EPA TANKS 4.09d program, which uses the equations of AP-42 Chapter 7.1 – Organic Liquid Storage Tanks.

Emissions for the lube oil, antifreeze, and TEG tanks are negligible due to the low VOC content of each product; however, Targa has conservatively assumed emissions from each tank will be less than 0.01 tons per year (tpy) per tank.

3.2.3. Loading Losses

Loading losses for the produced water (EU 8) and condensate (EU 13) being loaded into tank trucks were calculated using equations from AP-42 Section 5.2 – Transportation and Marketing of Petroleum Liquids (7/08). Variables for the equation including molecular weight, vapor pressure and vapor content were taken from the ProMax vapor phase of the condensate tank. Note that the composition of the produced water loaded was assumed to be 1% condensate.

3.2.4. Pigging Operations

The facility receives PIGs through one 8" and one 10" natural gas line, and launches PIGs through one 8" and one 10" natural gas line and one 10" condensate line. Each time a PIG is received or launched at the facility, the PIG trap must be depressurized to atmosphere in order to remove the PIG from or insert the PIG into the pipeline. VOC and HAP emissions will occur from each depressurization event. The operating conditions and dimensions of each receiver were used to calculate the volume of gas vented during each depressurization event. Emissions were calculated based on the depressurization volume, gas composition and number of depressurization events. Both PTE and actual emissions for 2018 are based on estimates of seven low-pressure events per week and one high-pressure event per month.

3.2.5. Fugitive Emissions

Fugitive component leak emissions (EU 15) were calculated based on the emission factors in Table 2-4 of Protocol for Equipment Leak Emission Estimates (EPA 453/R-95-017). Components in each service were updated based on component counts from a similar facility. Stream compositions were taken from site-specific condensate and field gas analyses. Both actual and PTE emissions assume 8,760 hours of operation.

3.2.6. Glycol Dehydrator

One 36 MMscfd TEG dehydrator (EU 10) will be used to remove water from natural gas. VOC and HAP emissions were calculated using GRI-GLYCalc v4.0. Inputs to the model are based on an extended site-specific gas analysis from a similar site, using the maximum gas throughput, the maximum glycol pump rate, and the operating conditions of the dehydrator. The maximum glycol pump rate was used per the requirements of 40 CFR Part 63.760(a)(1)(iii). Actual emissions are assumed equal to PTE emissions.

3.2.7. Natural Gas-Fired Heaters

There is one natural gas-fired glycol reboiler (EU 16) located at the facility. Targa calculated emissions from this unit based on the maximum heat input and the emission factors listed in AP-42 Section 1.4 – Natural Gas Combustion (7/98). Actual emissions are assumed equal to PTE emissions.

3.2.8. Vapor Combustor

There is one vapor combustor (EU 14) at the facility, which is used to control emissions from the condensate tanks (EU 11, EU 12) and the produced water tank (EU 7), and is also able to control emissions from the glycol reboiler. The vapor combustor has a 98% control efficiency; however, a 95% control efficiency is claimed on each condensate tank, as required by 40 CFR 60, Subpart OOOOa. In addition, a natural gas-fired pilot is associated with the vapor combustor, and also contributes to emissions.

VOC and HAP emissions from the vapor combustor were calculated by adding the uncontrolled portion of emissions from both condensate tanks to the combustion emissions from the condensate vapors and pilot. The pilot VOC and HAP emissions were calculated using a speciated fuel gas analysis, pilot gas flowrate and applying

a 95% control efficiency. Formaldehyde emissions were calculated separately for both the condensate vapor and the pilot gas combustion by using emission factors from AP-42 Section 1.4 – Natural Gas Combustion (7/98) and the flowrate of both the vapor in the tanks as well as the flowrate of the pilot gas. CO and NO_x emissions were also calculated for the vapor combustor using emission factors from AP-42 Section 13.5 – Industrial Flares (2/18). SO_2 emissions were calculated for the pilot by applying a flare efficiency fraction and fuel sulfur content to the total pilot fuel that was burned.

As requested on the Part 2 application form, Targa has completed a regulatory applicability review of each emission unit at the facility, including the following potentially applicable regulations, standards, and provisions:

- Minor Source New Source Review (NSR) and Prevention of Significant Deterioration (PSD);
- Federal Title V Operating Permit Program (Title V) and Compliance Assurance Monitoring (CAM);
- New Source Performance Standards (NSPS) in 40 CFR Part 60; and
- National Emission Standards for Hazardous Air Pollutants (NESHAP) in 40 CFR Part 63.

The federal regulatory programs, as promulgated by the United States Environmental Protection Agency (U.S. EPA), and administered by Region 8 have been developed under the authority of the 1970 Clean Air Act (or Act) and subsequent amendments.

4.1. MINOR SOURCE NEW SOURCE REVIEW (NSR) AND PREVENTION OF SIGNIFICANT DETERIORATION (PSD)

The FIP for True Minor Oil and Gas Sources requires that oil and gas sources that are considered true minor sources under the Prevention of Significant Deterioration (PSD) program must register as a minor source with the EPA. The facility is located in North Dakota, which is designated as attainment or unclassifiable for all criteria pollutants per 40 CFR 81.335. PSD preconstruction permitting applies to Categorical Sources as listed in 40 CFR 52.21(b)(1)(i)(a) (also known as the list of 28) that have the potential to emit above 100 tpy of any criteria pollutant or non-Categorical Sources that have the potential to emit above 250 tpy of any criteria pollutant. Compressor stations are not classified as a Categorical Source; therefore, the major source emission rate threshold for this source type is 250 tpy of any criteria pollutant. The facility does not have a potential to emit which exceeds the PSD major source threshold of 250 tpy of any criteria pollutant, and is therefore a true minor stationary source with respect to PSD as shown in Table 3-2.

As the facility meets the definition of "oil and natural gas source" in §49.402 and meets the requirements outlined in §49.101(b) and §49.151(c)(1)(iii)(B), it is subject to the FIP requirements outlined in §49.101-105. A Part 1 form for the facility, which included a threatened or endangered species and historic properties review per the requirements of §49.104, was submitted prior to the construction of the facility. This application is being submitted to meet the Part 2 requirements. Per §49.105, Targa evaluated NSPS and NESHAP applicability for the site, as outlined in Sections 4.3 and 4.4.

4.2. FEDERAL TITLE V OPERATING PERMIT PROGRAM (TITLE V) AND COMPLIANCE ASSURANCE MONITORING (CAM)

Per 40 CFR 71.3(a) and 40 CFR 71.5(a)(1), sources that have the potential to emit above 100 tpy of any criteria pollutant, 10 tpy of a single HAP, or 25 tpy of total HAPs are required to submit an operating permit application within one year of commencing operation. As shown in Tables 3-2 and 3-3, the facility is considered a major source under Part 71. As operations commenced on December 6, 2017, Targa will submit a Title V application separately within one year of operations commencing. The applicability of Compliance Assurance Monitoring (CAM) as outlined in 40 CFR 64.2(a) will be addressed at that time.

4.3. NEW SOURCE PERFORMANCE STANDARDS (NSPS)

New Source Performance Standards (NSPS) are nationwide regulations that regulate air pollution from new, modified, and reconstructed stationary source categories determined to cause or contribute significantly to air pollution and that may reasonably be anticipated to endanger public health. The FIP for True Minor Oil and Gas Sources allows the following five NSPS subparts:

- Subpart IIII – Standards of Performance for Stationary Compression Ignition Internal Combustion Engines;
- Subpart JJJJ – Standards of Performance for Stationary Spark Ignition Internal Combustion Engines;
- Subpart Kb – Standards of Performance for Volatile Organic Liquid Storage Vessels (Including Petroleum Liquid Storage Vessels) for Which Construction, Reconstruction, or Modification Commenced After July 23, 1984;
- Subpart OOOOa – Standards of Performance for Crude Oil and Natural Gas Facilities for which Construction, Modification, or Reconstruction Commenced after September 18, 2015; and
- Subpart KKKK – Standards of Performance for New Stationary Combustion Turbines.

In addition to these subparts, Targa reviewed the following subparts to ensure that no units at the site are subject to a subpart not allowed under the FIP.

- Subpart A – General Provisions
- Subpart Dc - Standard of Performance for Small Industrial-Commercial-Institutional Steam Generating Units; and
- Subpart KKK – Standards of Performance for Equipment Leaks from Onshore Natural Gas Processing Plants.

4.3.1. Subpart IIII - Standards of Performance for Stationary Compression Ignition Internal Combustion Engines

NSPS Subpart IIII (NSPS IIII) applies to manufacturers, owners, and operators of stationary compression ignition internal combustion engines (ICEs). None of the engines at the facility are compression ignition engines, thus no units are subject to this subpart.

4.3.2. Subpart JJJJ - Standards of Performance for Stationary Spark Ignition Internal Combustion Engines

NSPS Subpart JJJJ (NSPS JJJJ) applies to manufacturers, owners, and operators of stationary spark ignition ICEs. The compressor engines (EU 1, EU 2, EU 3, EU 4, EU 5, and EU 6) are 4SRB reciprocating ICEs, each with a horsepower rating greater than 500 hp and manufactured after July 1, 2010. As such, EU 1, EU 2, EU 3, EU 4, EU 5, and EU 6 are subject to NSPS JJJJ. In addition, the two generator engines at the site (EU 27 and EU 28) are four-stroke rich burn reciprocating ICEs, each with a horsepower rating less than 500 hp and manufactured after January 1, 2011. As such, EU 27 and EU 28 are also subject to NSPS JJJJ. Both EU 27 and EU 28 will be considered certified engines under §60.4230(a)(4)(iii), but will be operated as non-certified. In order to comply with the emission limits of NSPS JJJJ, Table 1 (1.0 g/hp-hr NO_x; 2.0 g/hp-hr CO, 0.7 g/hp-hr VOC), engines EU 1, EU 2, EU 3, EU 4, EU 5, EU 6, EU 27, and EU 28 will each be equipped with a catalyst. In addition, each engine will comply with the compliance requirements of §60.4234, §60.4243(b), performance testing requirements of §60.4244, and notification, reporting, and recordkeeping requirements of §60.4245(a) and (d).

4.3.3. Subpart Kb - Standards of Performance for Volatile Organic Liquid Storage Vessels (Including Petroleum Liquid Storage Vessels) for Which Construction, Reconstruction, or Modification Commenced After July 23, 1984

NSPS Subpart Kb (NSPS Kb) applies to each storage vessel at a facility with a capacity greater than or equal to 75 cubic meters that is used to store volatile organic liquids for which construction, reconstruction, or modification is commenced after July 23, 1984. The largest tanks at the facility have a capacity of 400 barrels, or approximately 63.6 cubic meters, thus none of the storage tanks at the facility are subject to this rule.

4.3.4. Subpart OOOOa - Standards of Performance for Crude Oil and Natural Gas Facilities for which Construction, Modification, or Reconstruction Commenced after September 18, 2015

NSPS Subpart OOOOa (NSPS OOOOa) applies to Crude Oil and Natural Gas Production, Transmission, and Distribution Facilities for onshore natural gas processing plants. NSPS OOOOa regulates emissions and work practice standards for well affected facilities, centrifugal compressors, reciprocating compressors, pneumatic controllers, storage vessels, equipment leaks, sweetening units, and pneumatic pumps. The facility is not considered a well affected facility, and does not contain any centrifugal compressors or sweetening units. Applicability of the remaining items is outlined below.

- *Reciprocating Compressors* – Per §60.5365a(c), each reciprocating compressor affected facility, which is a single reciprocating compressor, is subject to NSPS OOOOa. The six (6) reciprocating compressors associated with EU 1 through 6 meet this criteria and will be subject to NSPS OOOOa requirements. Per 40 CFR §60.5385a, reciprocating compressors are required to replace the rod packing before the compressor has operated for 26,000 hours, or prior to 36 months from the date of the most recent rod packing replacement. Alternatively, Targa could collect the methane and VOC emissions from the rod packing using a rod packing emission collection system that operates under negative pressure and route the rod packing emissions to a process through a closed vent system. Targa will comply with one of these requirements.
- *Pneumatic Controllers* – Per §60.5365a(d), a pneumatic controller at a natural gas processing plant is defined as a single continuous bleed natural gas-driven pneumatic controller. Each of the pneumatic controllers at the site are instrument air, and are not natural gas-driven. As such, the pneumatic controllers at the facility are not subject to this subpart.
- *Storage Vessels* – Per §60.5365a(e), a storage vessel is an affected facility if it is located in the oil and natural gas production segment and has potential to emit (PTE) of 6 tpy or more VOC emissions. The two condensate tanks (EU 11 and EU 12) have a PTE greater than 6 tpy of VOC, thus are subject to the provision of NSPS OOOOa. As such, a vapor combustor (EU 14) was installed as a control device for the two condensate tanks, which will meet the control requirements of §60.5395(a)(2). Targa will comply with the compliance monitoring, recordkeeping, and emissions limitations for storage vessels as outlined in NSPS OOOOa. None of the other tanks at the facility have a PTE greater than 6 tpy of VOC, thus no other storage vessels are subject to NSPS OOOOa. While the produced water tank (EU 7) also vents to EU 14, the unit is not subject to NSPS OOOOa, thus no controls are claimed for the unit.
- *Pneumatic Pumps* – Per §60.5365a(h), pneumatic pumps at natural gas processing plants are considered single natural gas-driven diaphragm pumps. The pneumatic pumps at the site are either instrument air or electric, and thus are not natural gas-driven. As such, the pneumatic pumps at the facility are not subject to this rule.
- *Equipment Leaks* – Per §60.5365a(j), the collection of fugitive emissions components at a compressor station is an affected facility. As such, the equipment leak components at the site will be subject to the compliance monitoring, recordkeeping, and emission limitations for equipment leaks as outlined in NSPS OOOOa per §60.5397.

4.3.5. Subpart KKKK - Standards of Performance for New Stationary Combustion Turbines

NSPS Subpart KKKK (NSPS KKKK) applies to stationary combustion turbines. No turbines are located at the facility, thus no units at the site are subject to this subpart.

4.3.6. Subpart A - General Provisions

Certain provisions of 40 CFR Part 60 Subpart A apply to the owner or operator of any stationary source subject to a NSPS. Since the facility is subject to at least one NSPS subpart, the facility will comply with the applicable general requirements in Subpart A. Unless specifically excluded by the source-specific NSPS, Subpart A generally requires initial construction notification, initial startup notification, performance tests, performance test date initial notification, general monitoring requirements, general recordkeeping requirements, and semiannual monitoring and/or excess emission reports.

4.3.7. Subpart Dc - Standards of Performance for Small Industrial-Commercial Institutional Steam Generating Units

NSPS Subpart Dc applies to steam generating units for which construction, modification, or reconstruction is commenced after June 9, 1989 and that have a maximum design heat input capacity of greater than or equal to 10 MMBtu/hr and less than or equal to 100 MMBtu/hr. Since the glycol reboiler (EU 16) has a heat input capacity of less than 10 MMBtu/hr, unit is not subject to the requirements of Subpart Dc.

4.3.8. Subpart KKK - Standards of Performance for Equipment Leaks from Onshore Natural Gas Processing Plants

NSPS Subpart KKK (Subpart KKK) applies to equipment leaks from natural gas processing plants that were constructed after June 20, 1984 and before August 23, 2011. The facility does not extract natural gas liquids and does not meet this definition of a natural gas processing plant. Therefore, this subpart does not apply.

4.4. NATIONAL EMISSION STANDARDS FOR HAZARDOUS AIR POLLUTANTS (NESHAP)

NESHAP for Source Categories known as Maximum Available Control Technology (MACT) standards affect certain designated industrial sources referred to as "source categories" that may emit or have the potential to emit one or more of 188 designated HAPs. MACT standards (subparts) are codified in 40 CFR Part 63. The FIP for True Minor Oil and Gas Sources allows the following three NESHAP subparts:

- Subpart DDDDD – National Emission Standards for Hazardous Air Pollutants for Major Sources: Industrial, Commercial, an Institutional Boilers and Process Heaters;
- Subpart ZZZZ – National Emission Standards for Hazardous Air Pollutants for Reciprocating Internal Combustion Engines; and
- Subpart HH – National Emission Standards for Hazardous Air Pollutants from Natural Gas Production Facilities.

In addition to these subparts, Targa reviewed the following subparts to ensure that no units at the site are subject to a subpart not allowed under the FIP.

- Subpart A – General Provisions
- Subpart JJJJJJ - National Emission Standards for Hazardous Air Pollutants for Industrial, Commercial, and Institutional Boilers Area Sources

MACT standards regulate affected sources located at "major sources" and "area sources." A major source is defined in Subpart A as having the potential to emit 10 tpy of any single HAP or 25 tpy of any combination of HAPs. An area source is any source that is not a major source.

Currently, the facility does not exceed these thresholds, and thus is considered an area source of HAP.

4.4.1. Subpart DDDDD - National Emission Standards for Hazardous Air Pollutants for Major Sources: Industrial, Commercial, an Institutional Boilers and Process Heaters

NESHAP Subpart DDDDD (NESHAP DDDDD) applies to industrial, commercial, and institutional boilers and process heaters located at major sources of HAP. Per §63.7485, "major source" for oil and natural gas production facilities is defined in §63.7575. Per §63.7575, for facilities that are production field facilities, only HAP emissions from glycol dehydration units and storage vessels with the potential for flash emissions shall be aggregated for major source determination. As the HAP emissions from the glycol dehydration unit and the storage vessels with the potential for flash emissions do not exceed the major source thresholds, this subpart does not apply.

4.4.2. Subpart ZZZZ - National Emission Standards for Hazardous Air Pollutants for Reciprocating Internal Combustion Engines

NESHAP Subpart ZZZZ (NESHAP ZZZZ) applies to stationary reciprocating ICEs located at both major and area sources of HAP. Each of the engines at the site (EU 1, EU 2, EU 3, EU 4, EU 5, EU 6, EU 27, and EU 28) will commence construction after June 12, 2006, and thus are considered "new" per NESHAP ZZZZ. As these new engines are located at an area source of HAP, their only requirement under NESHAP ZZZZ is to comply with the applicable requirements of NSPS JJJJ per §63.6590(c)(1).

4.4.3. Subpart HH - National Emission Standards for Hazardous Air Pollutants from Natural Gas Production Facilities

NESHAP Subpart HH (NESHAP HH) applies to area and major sources located at oil and natural gas production facilities including well sites/pads, tank batteries, gas plants, compressor stations and other facilities that operate one or more "affected sources."

Pursuant to the definitions in §63.761, the facility is an area source of HAP emissions since the facility is considered a production field facility located prior to custody transfer and only HAP emissions from glycol dehydration units and storage vessels are considered for major source determination. Per §63.760(b)(2), the only affected sources at area sources are TEG units. The proposed glycol dehydrator (EU 15) is located at an area source of HAP, and has a potential to emit of less than 0.90 megagrams (1 ton) per year of benzene. As such, this unit is exempt from emission limits of 40 CFR Part 63, Subpart HH based on §63.764(e)(1)(ii), but is subject to the recordkeeping requirements of §63.774(d)(1).

4.4.4. Subpart A - General Provisions

The General Provisions set out in Subpart A apply for any source that is regulated by any MACT standard. Individual standards under Part 63 have requirements that differ from Subpart A, whereby the requirements within the relevant rule should be followed. The U.S. EPA provides a tabular summary at the end of each MACT that specifies those General Provisions that apply and those which do not for a particular rule. Specific sections of Subpart A that apply each affected source are covered in the sections below.

4.4.5. Subpart JJJJJJ - National Emission Standards for Hazardous Air Pollutants for Industrial, Commercial, and Institutional Boilers Area Sources

Subpart JJJJJJ applies to owners or operators of industrial, commercial, or institutional boilers located at an area sources of HAPs as defined in §63.2. As the facility is an area source of HAP, the glycol reboiler (EU 16) is potentially applicable to this subpart. However, per §63.11195, gas-fired boilers, as defined in §63.11237, are not subject to this rule. As EU 16 burns gaseous fuels not combined with any solid fuels, it meets the definition of "gas-fired boiler," and thus is not subject to this subpart.

APPENDIX A: TRUE MINOR SOURCE FIP REGISTRATION FORM - PART 2

EPA Form No. 5900-391
EPA ICR No. 1230.27
OMB Control No. 2060-0003
Approval expires 4/30/2017

United States Environmental Protection Agency
https://www.epa.gov/tribal-air/tribal-minor-new-source-review
January 4, 2017

Part 2: Submit Within 60 Days After Startup of Production -- Emission and Production Information

FEDERAL IMPLEMENTATION PLAN FOR TRUE MINOR SOURCES IN INDIAN COUNTRY IN THE OIL AND NATURAL GAS PRODUCTION AND NATURAL GAS PROCESSING SEGMENTS OF THE OIL AND NATURAL GAS SECTOR

Registration for New True Minor Oil and Natural Gas Sources and Minor Modifications at Existing True Minor Oil and Natural Gas Sources

Please submit information to:

[Reviewing Authority Address Phone]	US EPA Region 8 1595 Wynkoop Street, 8P-AR Denver, CO 80202

A. GENERAL SOURCE INFORMATION (See Instructions Below)

1. Company Name Targa Badlands LLC		**2. Source Name** TAT - Blue Buttes Compressor Station	
3. Type of Oil and Natural Gas Operation Natural Gas Compression and Dehydration		**4. New Minor Source?** ☒ Yes ☐ No **5. True Source Modification?** ☐ Yes ☒ No	
6. NAICS Code 211111		**7. SIC Code** 1311	
8. U.S. Well ID(s) or API Number(s) [if applicable] N/A			
9. Area of Indian Country Fort Berthold Indian Reservation	**10. County** McKenzie	**11a. Latitude** NW 1/4, NE 1/4, S31, T151N, R94W	**11b. Longitude** See 11a

B. CONTACT INFORMATION (See Instructions Below)

1. Owner Name Francis Foret	Title Senior VP Operations
Mailing Address 811 Louisiana Street, Suite 2100, Houston, Texas 77002-1400	
Email Address fforet@targaresources.com	
Telephone Number 713-584-1138	Facsimile Number 713-584-1522
2. Operator Name (if different from owner) Same as Company Contact	Title
Mailing Address	
Email Address	
Telephone Number	Facsimile Number
3. Source Contact Catherine Schroder	Title Senior Environmental Specialist
Mailing Address 14000 Quail Springs Parkway Suite 215, Oklahoma City, OK 73134	
Email Address cschroder@targaresources.com	
Telephone Number 405-749-5614	Facsimile Number 918-925-3841

4. Compliance Contact	Title
Mitchell Anderson	Senior Environmental Specialist
Mailing Address: 1939 125th Ave. NW, Watford City, ND 58854	
Email Address: mitchellanderson@targaresources.com	
Telephone Number: 701-842-3315	Facsimile Number

C. EMISSIONS AND OTHER SOURCE INFORMATION

Include all of the following information in the table below and as attachments to this form:

Note: The emission estimates can be based upon actual test data or, in the absence of such data, upon procedures acceptable to the Reviewing Authority. The following procedures are generally acceptable for estimating emissions from air pollution sources: (1) unit-specific emission tests; (2) mass balance calculations; (3) published, verifiable emission factors that are applicable to the unit (i.e., manufacturer specifications); (4) other engineering calculations; or (5) other procedures to estimate emissions specifically approved by the Reviewing Authority. Guidance for estimating emissions can be found at https://www.epa.gov/chief.

- ■ Narrative description of the operations.
- ■ Identification and description of any air pollution control equipment and compliance monitoring devices or activities.
- ■ Type and actual amount (annually) of each fuel that will be used.
- ■ Type of raw materials used (e.g., water for hydraulic fracturing).
- ■ Actual, annual production rates.
- ■ Actual operating schedules.
- ■ Any existing limitations on source operations affecting emissions or any work practice standards, where applicable, for all regulated New Source Review (NSR) pollutants at your source. Indicate all requirements referenced in the Federal Implementation Plan (FIP) for True Minor Sources in Indian Country in the Oil and Natural Gas Production and Natural Gas Processing Segments of the Oil and Natural Gas Sector that apply to emissions units and air pollution generating activities at the source or proposed. Include statements indicating each emissions unit that is an emissions unit potentially subject to the requirements referenced in the FIP, but does not meet the definition of an affected facility under the referenced requirement, and therefore, is not subject to those requirements.
- ■ For each emissions unit comprising the new source or modification, estimates of the total allowable (potential to emit) annual emissions at startup of production from the air pollution source for the following air pollutants: particulate matter, PM_{10}, $PM_{2.5}$, sulfur oxides ( ), nitrogen oxides (NO_x), carbon monoxide (CO), volatile organic compound (VOC), lead (Pb) and lead compounds, fluorides (gaseous and particulate), sulfuric acid mist (H_2SO_4), hydrogen sulfide (H_2S), total reduced sulfur (TRS) and reduced sulfur compounds, including all calculations for the estimates. Allowable annual emissions are defined as: emissions rate of an emissions unit calculated using the maximum capacity of a stationary source to emit a pollutant under its physical and operational design. Any physical

or operational limitation on the capacity of the source to emit a pollutant, including air pollution control equipment and restrictions on hours of operation or on the type or amount of material combusted, stored, or processed, shall be treated as part of its design if the limitation, or the effect it would have on emissions, is legally and practically enforceable. You must determine the potential for emissions within 30 days from the startup of production.

▣ For each emissions unit comprising the new source or modification, estimates of the total actual annual emissions during the upcoming, consecutive 12 months from the air pollution source for the following air pollutants: particulate matter (PM, PM_{10}, $PM_{2.5}$), sulfur oxides (SO_x), nitrogen oxides (NOx), carbon monoxide (CO), volatile organic compound (VOC), lead (Pb) and lead compounds, ammonia (NH_3), fluorides (gaseous and particulate), sulfuric acid mist (H_2SO_4), hydrogen sulfide (H_2S), total reduced sulfur (TRS) and reduced sulfur compounds, including all calculations for the estimates. Estimates of actual emissions must take into account equipment, operating conditions, and air pollution control measures. You should calculate an estimate of the actual annual emissions using estimated operating hours, production rates, in-place control equipment, and types of materials processed, stored, or combusted.

D. TABLE OF ESTIMATED EMISSIONS

Provide in the table below estimates of the total allowable annual emissions in tons per year (tpy) and total actual annual emissions (tpy) for the following pollutants for all emissions units comprising the new source or modification.

POLLUTANT	TOTAL ALLOWABLE ANNUAL EMISSIONS (TPY)	TOTAL ACTUAL ANNUAL EMISSIONS (TPY)
PM	6.64	6.64
PM_{10}	6.64	6.64
$PM_{2.5}$	6.64	6.64
SO_x	0.20	0.20
NO_x	90.08	90.08
CO	179.95	179.95
VOC	117.04	117.04
Pb	-	-

POLLUTANT	TOTAL ALLOWABLE ANNUAL EMISSIONS (TPY)	TOTAL ACTUAL ANNUAL EMISSIONS (TPY)
NH3	-	-
Fluorides	-	-
H_2SO_4	-	-
H_2S	-	-
TRS	-	-

APPENDIX B: POTENTIAL TO EMIT CALCULATIONS

Targa Badlands LLC - TAT-Blue Buttes Compressor Station
Potential to Emit Summary

EU	EPN	Equipment Description	Design Rating	Criteria Pollutant Emissions (tpy)					
				NO_x	CO	VOC	SO_2	PM_{10}	$PM_{2.5}$
EU 1	EPN 1	Waukesha L5794GSI	1,380 hp	13.33	26.65	9.99	0.03	0.99	0.99
EU 2	EPN 2	Waukesha L5794GSI	1,380 hp	13.33	26.65	9.99	0.03	0.99	0.99
EU 3	EPN 3	Waukesha L5794GSI	1,380 hp	13.33	26.65	9.99	0.03	0.99	0.99
EU 4	EPN 4	Waukesha L5794GSI	1,380 hp	13.33	26.65	9.99	0.03	0.99	0.99
EU 5	EPN 5	Waukesha L5794GSI	1,380 hp	13.33	26.65	9.99	0.03	0.99	0.99
EU 6	EPN 6	Waukesha L5794GSI	1,380 hp	13.33	26.65	9.99	0.03	0.99	0.99
EU 7	EPN 7	Produced Water Tank [1]	400 bbl	-	-	-	-	-	-
EU 8	EPN 8	Produced Water Loading Losses	82.20 bbl/day	-	-	0.12	-	-	-
EU 9	EPN 9	PIG Launchers/Receivers	-	-	-	0.51	-	-	-
EU 10	EPN 10	Fugitive Emissions	-	-	-	29.60	-	-	-
EU 11	EPN 14	Condensate Tank #1 [1]	400 bbl	-	-	-	-	-	-
EU 12	EPN 14	Condensate Tank #2 [1]	400 bbl	-	-	-	-	-	-
EU 13	EPN 13	Condensate Loading Losses	255 bbl/day	-	-	16.94	-	-	-
EU 14	EPN 14	Vapor Combustor [1]	-	0.05	0.22	2.01	1.09E-04	-	-
EU 15	EPN 15	Dehy Process Vents	36 MMscfd	-	-	29.90	-	-	-
EU 16	EPN 16	Glycol Reboiler	0.675 MMBtu/hr	0.29	0.24	0.02	1.74E-03	0.02	0.02
EU 17	EPN 17	Methanol Storage Tank	2,000 gal	-	-	0.02	-	-	-
EU 18	EPN 18	Lube Oil Tank #1	500 gal	-	-	1.00E-03	-	-	-
EU 19	EPN 19	Lube Oil Tank #2	500 gal	-	-	1.00E-03	-	-	-
EU 20	EPN 20	Lube Oil Tank #3	500 gal	-	-	1.00E-03	-	-	-
EU 21	EPN 21	Lube Oil Tank #4	500 gal	-	-	1.00E-03	-	-	-
EU 22	EPN 22	Lube Oil Tank #5	500 gal	-	-	1.00E-03	-	-	-
EU 23	EPN 23	Lube Oil Tank #6	500 gal	-	-	1.00E-03	-	-	-
EU 24	EPN 24	Antifreeze Tank #1	500 gal	-	-	1.00E-03	-	-	-
EU 25	EPN 25	Antifreeze Tank #2	500 gal	-	-	1.00E-03	-	-	-
EU 26	EPN 26	TEG Tank	500 gal	-	-	1.00E-03	-	-	-
EU 27	EPN 27	Doosan/PSI FPSIB21.9NGP	507 hp	4.90	9.79	3.78	0.01	0.33	0.33
EU 28	EPN 28	Doosan/PSI FPSIB21.9NGP	507 hp	4.90	9.79	3.78	0.01	0.33	0.33
Facility Total				**90.08**	**179.95**	**146.64**	**0.20**	**6.64**	**6.64**
Part 71 Potential to Emit Total [2]				**90.08**	**179.95**	**117.04**	**0.20**	**6.64**	**6.64**

1. Emissions from the two condensate tanks and one produced water tank are routed through the Vapor Combustor, and thus are included in the vapor combustor emission totals.

2. Part 71 Potential to Emit Total does not include fugitive criteria pollutant emissions, as fugitive non-HAP emissions are not included in major source applicability.

EU	EPN	Equipment Description	Design Rating	HAP Emissions (tpy)										
				Acetalde-hyde	Acrolein	n-Hexane	Benzene	Toluene	Ethyl-benzene	Xylenes	2,2,4-TMP	CH_2O	Methanol	Total HAP
EU 1	EPN 1	Waukesha L5794GSI	1,380 hp	0.14	0.13	-	0.08	0.03	1.27E-03	9.97E-03	-	0.67	0.16	1.28
EU 2	EPN 2	Waukesha L5794GSI	1,380 hp	0.14	0.13	-	0.08	0.03	1.27E-03	9.97E-03	-	0.67	0.16	1.28
EU 3	EPN 3	Waukesha L5794GSI	1,380 hp	0.14	0.13	-	0.08	0.03	1.27E-03	9.97E-03	-	0.67	0.16	1.28
EU 4	EPN 4	Waukesha L5794GSI	1,380 hp	0.14	0.13	-	0.08	0.03	1.27E-03	9.97E-03	-	0.67	0.16	1.28
EU 5	EPN 5	Waukesha L5794GSI	1,380 hp	0.14	0.13	-	0.08	0.03	1.27E-03	9.97E-03	-	0.67	0.16	1.28
EU 6	EPN 6	Waukesha L5794GSI	1,380 hp	0.14	0.13	-	0.08	0.03	1.27E-03	9.97E-03	-	0.67	0.16	1.28
EU 7	EPN 7	Produced Water Tank [1]	400 bbl	-	-	-	-	-	-	-	-	-	-	-
EU 8	EPN 8	Produced Water Loading Losses	82.20 bbl/day	-	-	2.25E-03	1.72E-04	1.39E-04	1.10E-05	1.81E-05	1.09E-04	-	-	2.70E-03
EU 9	EPN 9	PIG Launchers/Receivers	-	-	-	2.71E-03	-	1.42E-04	-	1.63E-04	6.14E-04	-	-	3.63E-03
EU 10	EPN 10	Fugitive Emissions	-	-	-	1.69	0.12	0.39	0.11	0.19	0.28	-	0.67	3.44
EU 11	EPN 14	Condensate Tank #1 [1]	400 bbl	-	-	-	-	-	-	-	-	-	-	-
EU 12	EPN 14	Condensate Tank #2 [1]	400 bbl	-	-	-	-	-	-	-	-	-	-	-
EU 13	EPN 13	Condensate Loading Losses	255 bbl/day	-	-	0.32	0.02	0.02	1.59E-03	2.61E-03	0.02	-	-	0.39
EU 14	EPN 14	Vapor Combustor [1]	-	-	-	0.13	8.88E-03	0.02	6.31E-03	0.01	0.02	3.34E-05	-	0.20
EU 15	EPN 15	Dehy Process Vents	36 MMscfd	-	-	0.50	-	1.54	-	2.99	-	-	-	5.03
EU 16	EPN 16	Glycol Reboiler	0.675 MMBtu/hr	-	-	5.22E-03	6.09E-06	9.86E-06	-	-	-	2.17E-04	-	5.46E-03
EU 17	EPN 17	Methanol Storage Tank	2,000 gal	-	-	-	-	-	-	-	-	-	0.02	0.02
EU 18	EPN 18	Lube Oil Tank #1	500 gal	-	-	-	-	-	-	-	-	-	-	1.00E-03
EU 19	EPN 19	Lube Oil Tank #2	500 gal	-	-	-	-	-	-	-	-	-	-	1.00E-03
EU 20	EPN 20	Lube Oil Tank #3	500 gal	-	-	-	-	-	-	-	-	-	-	1.00E-03
EU 21	EPN 21	Lube Oil Tank #4	500 gal	-	-	-	-	-	-	-	-	-	-	1.00E-03
EU 22	EPN 22	Lube Oil Tank #5	500 gal	-	-	-	-	-	-	-	-	-	-	1.00E-03
EU 23	EPN 23	Lube Oil Tank #6	500 gal	-	-	-	-	-	-	-	-	-	-	1.00E-03
EU 24	EPN 24	Antifreeze Tank #1	500 gal	-	-	-	-	-	-	-	-	-	-	1.00E-03
EU 25	EPN 25	Antifreeze Tank #2	500 gal	-	-	-	-	-	-	-	-	-	-	1.00E-03
EU 26	EPN 26	TEG Tank	500 gal	-	-	-	-	-	-	-	-	-	-	1.00E-03
EU 27	EPN 27	Doosan/PSI FPSIB21.9NGP	507 hp	0.05	0.05	-	0.03	0.01	4.25E-04	3.34E-03	-	0.35	0.05	0.56
EU 28	EPN 28	Doosan/PSI FPSIB21.9NGP	507 hp	0.05	0.05	-	0.03	0.01	4.25E-04	3.34E-03	-	0.35	0.05	0.56
Facility Total				**0.95**	**0.90**	**2.66**	**0.69**	**2.16**	**0.12**	**3.26**	**0.31**	**4.70**	**1.73**	**17.87**

1. Emissions from the two condensate tanks and one produced water tank are routed through the Vapor Combustor, and thus are included in the vapor combustor emission totals.

Targa Badlands LLC - TAT-Blue Buttes Compressor Station
Waukesha L5794GSI Compressor - IC Engine Emissions Calculations

TAT-Blue Buttes Compressor Station Engine Data (EU 1/EPN 1)					
IC Engine Make [1]	Waukesha		Higher Heating Value [1]	1,035.2	Btu/scf
IC Engine Model [1]	L5794GSI		Lower Heating Value [1]	935.8	Btu/scf
Power Rating [1]	1,380	bhp	Sulfur Content [2]	2.00E-03	gr/scf
Heat Rate (HHV) [1]	8,456	Btu/bhp-hr	Fuel Consumption [1]	11,280	scf/hr
Duty (input)	11.67	MMBtu/hr	Fuel Consumption	109.24	MMscf/yr
Hours per Year	8,760	hr/yr	Exhaust Gas Flow [1]	6,379	acfm

Criteria Pollutant	Emission Factors		Emissions (lb/hr)	Emissions (tpy)	Source of Emission Factors [1,2]
NO_x	1.00	g/bhp-hr	3.04	13.33	NSPS JJJJ, Table 1
CO	2.00	g/bhp-hr	6.08	26.65	NSPS JJJJ, Table 1
VOC [3]	0.75	g/bhp-hr	2.28	9.99	NSPS JJJJ, Table 1; Manufacturer
Formaldehyde	0.05	g/bhp-hr	0.15	0.67	Manufacturer
SO_2 [2]	5.88E-04	lb/MMBtu	6.86E-03	0.03	AP-42 Tbl 3.2-3; 4SRB (7/00)
PM_{10} [4]	0.019	lb/MMBtu	0.23	0.99	AP-42 Tbl 3.2-3; 4SRB (7/00)
$PM_{2.5}$ [4]	0.019	lb/MMBtu	0.23	0.99	AP-42 Tbl 3.2-3; 4SRB (7/00)
TSP	0.019	lb/MMBtu	0.23	0.99	AP-42 Tbl 3.2-3; 4SRB (7/00)
Total HAP	-	-	0.29	1.28	AP-42 Tbl 3.2-3; 4SRB (7/00); Manufacturer

GHG	Emission Factors		Emissions (lb/hr)	Emissions (tpy)	Source of Emission Factors [1,2]
CO_2	473.00	g/bhp-hr	1,439.05	6,303.05	Manufacturer
CH_4	1.55	g/bhp-hr	4.72	20.65	Manufacturer
CO_2e	514.00	g/bhp-hr	1,563.79	6,849.40	Manufacturer

Sample Calculations:

(bhp) (Btu/bhp-hr) (MM/10^6) = MMBtu/hr; (MMBtu/hr) / (Btu/scf) (10^6/MM) = scf/hr
(g/bhp-hr) (bhp) (lb/453.59 g) = lb/hr; (lb/MMBtu) (MMBtu/hr) = lb/hr
(lb/hr) (hrs/yr) (ton/2000 lb) = tons/yr

1. Information from manufacturer's specification sheet.
2. SO_2 emissions based on AP-42 Section 3.2, Table 3.2-3 footnote e (7/00), which is based on 100% conversion of sulfur to SO_2 at 2,000 grains/MMscf. Sulfur content of fuel at the TAT-Blue Buttes Compressor Station assumed to be 2,000 grains/MMscf.
3. Per NSPS JJJJ Table 1, footnote d, formaldehyde is not included in the VOC emission factors in Table 1. As such, the formaldehyde emission factor of 0.05 g/bhp-hr from the manufacturer's specification sheet is added to the VOC emission factor in order to represent total VOCs.
4. Emission factor for TSP, PM_{10} and $PM_{2.5}$ from AP-42 Section 3.2, Table 3.2-3 (7/00); includes PM_{10}/$PM_{2.5}$ filterable (9.50e-03 lb/MMBtu) and PM condensable (9.91e-3 lb/MMBtu) = 0.01941 lb/MMBtu.

HAP	Rich Burn Emission Factors [1] (lb/MMBtu)	HAP Emissions	
		(lb/hr)	(tpy)
1,1,2,2-Tetrachloroethane	2.53E-05	2.95E-04	1.29E-03
1,1,2-Trichloroethane	1.53E-05	1.79E-04	7.82E-04
1,3-Butadiene	6.63E-04	7.74E-03	0.03
1,3-Dichloropropene	1.27E-05	1.48E-04	6.49E-04
Acetaldehyde	2.79E-03	0.03	0.14
Acrolein	2.63E-03	0.03	0.13
Benzene	1.58E-03	0.02	0.08
Carbon Tetrachloride	1.77E-05	2.07E-04	9.05E-04
Chlorobenzene	1.29E-05	1.51E-04	6.59E-04
Chloroform	1.37E-05	1.60E-04	7.00E-04
Ethylbenzene	2.48E-05	2.89E-04	1.27E-03
Ethylene Dibromide	2.13E-05	2.49E-04	1.09E-03
Formaldehyde [2]	-	0.15	0.67
Methanol	3.06E-03	0.04	0.16
Methylene Chloride	4.12E-05	4.81E-04	2.11E-03
Naphthalene	9.71E-05	1.13E-03	4.96E-03
PAH	1.41E-04	1.65E-03	7.21E-03
Styrene	1.19E-05	1.39E-04	6.08E-04
Toluene	5.58E-04	6.51E-03	0.03
Vinyl Chloride	7.18E-06	8.38E-05	3.67E-04
Xylene	1.95E-04	2.28E-03	9.97E-03
Total HAP Emissions		**0.29**	**1.28**

1. HAP emission factors from AP-42 Section 3.2, Table 3.2-3 (7/00).

2. Formaldehyde emission factor from manufacturer specification sheet:
0.05 [g/bhp-hr] * 1,380 [bhp] / 453.59 [g/lb] = 0.15 [lb/hr]

Targa Badlands LLC - TAT-Blue Buttes Compressor Station
Waukesha L5794GSI Compressor - IC Engine Emissions Calculations

TAT-Blue Buttes Compressor Station Engine Data (EU 2/EPN 2)					
IC Engine Make [1]	Waukesha		Higher Heating Value [1]	1,035.2	Btu/scf
IC Engine Model [1]	L5794GSI		Lower Heating Value [1]	935.8	Btu/scf
Power Rating [1]	1,380	bhp	Sulfur Content [2]	2.00E-03	gr/scf
Heat Rate (HHV) [1]	8,456	Btu/bhp-hr	Fuel Consumption [1]	11,280	scf/hr
Duty (input)	11.67	MMBtu/hr	Fuel Consumption	109.24	MMscf/yr
Hours per Year	8,760	hr/yr	Exhaust Gas Flow [1]	6,379	acfm

Criteria Pollutant	Emission Factors		Emissions (lb/hr)	Emissions (tpy)	Source of Emission Factors [1,2]
NO_x	1.00	g/bhp-hr	3.04	13.33	NSPS JJJJ, Table 1
CO	2.00	g/bhp-hr	6.08	26.65	NSPS JJJJ, Table 1
VOC [3]	0.75	g/bhp-hr	2.28	9.99	NSPS JJJJ, Table 1; Manufacturer
Formaldehyde	0.05	g/bhp-hr	0.15	0.67	Manufacturer
SO_2 [2]	5.88E-04	lb/MMBtu	6.86E-03	0.03	AP-42 Tbl 3.2-3; 4SRB (7/00)
PM_{10} [4]	0.019	lb/MMBtu	0.23	0.99	AP-42 Tbl 3.2-3; 4SRB (7/00)
$PM_{2.5}$ [4]	0.019	lb/MMBtu	0.23	0.99	AP-42 Tbl 3.2-3; 4SRB (7/00)
TSP	0.019	lb/MMBtu	0.23	0.99	AP-42 Tbl 3.2-3; 4SRB (7/00)
Total HAP	-	-	0.29	1.28	AP-42 Tbl 3.2-3; 4SRB (7/00); Manufacturer

GHG	Emission Factors		Emissions (lb/hr)	Emissions (tpy)	Source of Emission Factors [1,2]
CO_2	473.00	g/bhp-hr	1,439.05	6,303.05	Manufacturer
CH_4	1.55	g/bhp-hr	4.72	20.65	Manufacturer
CO_2e	514.00	g/bhp-hr	1,563.79	6,849.40	Manufacturer

Sample Calculations:

(bhp) (Btu/bhp-hr) (MM/10^6) = MMBtu/hr; (MMBtu/hr) / (Btu/scf) (10^6/MM) = scf/hr
(g/bhp-hr) (bhp) (lb/453.59 g) = lb/hr; (lb/MMBtu) (MMBtu/hr) = lb/hr
(lb/hr) (hrs/yr) (ton/2000 lb) = tons/yr

1. Information from manufacturer's specification sheet.

2. SO_2 emissions based on AP-42 Section 3.2, Table 3.2-3 footnote e (7/00), which is based on 100% conversion of sulfur to SO_2 at 2,000 grains/MMscf. Sulfur content of fuel at the TAT-Blue Buttes Compressor Station assumed to be 2,000 grains/MMscf.

3. Per NSPS JJJJ Table 1, footnote d, formaldehyde is not included in the VOC emission factors in Table 1. As such, the formaldehyde emission factor of 0.05 g/bhp-hr from the manufacturer's specification sheet is added to the VOC emission factor in order to represent total VOCs.

4. Emission factor for TSP, PM_{10} and $PM_{2.5}$ from AP-42 Section 3.2, Table 3.2-3 (7/00); includes PM_{10}/$PM_{2.5}$ filterable (9.50e-03 lb/MMBtu) and PM condensable (9.91e-3 lb/MMBtu) = 0.01941 lb/MMBtu.

HAP	Rich Burn Emission Factors [1] (lb/MMBtu)	HAP Emissions	
		(lb/hr)	(tpy)
1,1,2,2-Tetrachloroethane	2.53E-05	2.95E-04	1.29E-03
1,1,2-Trichloroethane	1.53E-05	1.79E-04	7.82E-04
1,3-Butadiene	6.63E-04	7.74E-03	0.03
1,3-Dichloropropene	1.27E-05	1.48E-04	6.49E-04
Acetaldehyde	2.79E-03	0.03	0.14
Acrolein	2.63E-03	0.03	0.13
Benzene	1.58E-03	0.02	0.08
Carbon Tetrachloride	1.77E-05	2.07E-04	9.05E-04
Chlorobenzene	1.29E-05	1.51E-04	6.59E-04
Chloroform	1.37E-05	1.60E-04	7.00E-04
Ethylbenzene	2.48E-05	2.89E-04	1.27E-03
Ethylene Dibromide	2.13E-05	2.49E-04	1.09E-03
Formaldehyde [2]	-	0.15	0.67
Methanol	3.06E-03	0.04	0.16
Methylene Chloride	4.12E-05	4.81E-04	2.11E-03
Naphthalene	9.71E-05	1.13E-03	4.96E-03
PAH	1.41E-04	1.65E-03	7.21E-03
Styrene	1.19E-05	1.39E-04	6.08E-04
Toluene	5.58E-04	6.51E-03	0.03
Vinyl Chloride	7.18E-06	8.38E-05	3.67E-04
Xylene	1.95E-04	2.28E-03	9.97E-03
Total HAP Emissions		**0.29**	**1.28**

1. HAP emission factors from AP-42 Section 3.2, Table 3.2-3 (7/00).

2. Formaldehyde emission factor from manufacturer specification sheet:
0.05 [g/bhp-hr] * 1,380 [bhp] / 453.59 [g/lb] = 0.15 [lb/hr]

Targa Badlands LLC - TAT-Blue Buttes Compressor Station
Waukesha L5794GSI Compressor - IC Engine Emissions Calculations

TAT-Blue Buttes Compressor Station Engine Data (EU 3/EPN 3)					
IC Engine Make [1]	Waukesha		Higher Heating Value [1]	1,035.2	Btu/scf
IC Engine Model [1]	L5794GSI		Lower Heating Value [1]	935.8	Btu/scf
Power Rating [1]	1,380	bhp	Sulfur Content [2]	2.00E-03	gr/scf
Heat Rate (HHV) [1]	8,456	Btu/bhp-hr	Fuel Consumption [1]	11,280	scf/hr
Duty (input)	11.67	MMBtu/hr	Fuel Consumption	109.24	MMscf/yr
Hours per Year	8,760	hr/yr	Exhaust Gas Flow [1]	6,379	acfm

Criteria Pollutant	Emission Factors		Emissions (lb/hr)	Emissions (tpy)	Source of Emission Factors [1,2]
NO_x	1.00	g/bhp-hr	3.04	13.33	NSPS JJJJ, Table 1
CO	2.00	g/bhp-hr	6.08	26.65	NSPS JJJJ, Table 1
VOC [3]	0.75	g/bhp-hr	2.28	9.99	NSPS JJJJ, Table 1; Manufacturer
Formaldehyde	0.05	g/bhp-hr	0.15	0.67	Manufacturer
SO_2 [2]	5.88E-04	lb/MMBtu	6.86E-03	0.03	AP-42 Tbl 3.2-3; 4SRB (7/00)
PM_{10} [4]	0.019	lb/MMBtu	0.23	0.99	AP-42 Tbl 3.2-3; 4SRB (7/00)
$PM_{2.5}$ [4]	0.019	lb/MMBtu	0.23	0.99	AP-42 Tbl 3.2-3; 4SRB (7/00)
TSP	0.019	lb/MMBtu	0.23	0.99	AP-42 Tbl 3.2-3; 4SRB (7/00)
Total HAP	-	-	0.29	1.28	AP-42 Tbl 3.2-3; 4SRB (7/00); Manufacturer

GHG	Emission Factors		Emissions (lb/hr)	Emissions (tpy)	Source of Emission Factors [1,2]
CO_2	473.00	g/bhp-hr	1,439.05	6,303.05	Manufacturer
CH_4	1.55	g/bhp-hr	4.72	20.65	Manufacturer
CO_2e	514.00	g/bhp-hr	1,563.79	6,849.40	Manufacturer

Sample Calculations:

(bhp) (Btu/bhp-hr) (MM/10^6) = MMBtu/hr; (MMBtu/hr) / (Btu/scf) (10^6/MM) = scf/hr
(g/bhp-hr) (bhp) (lb/453.59 g) = lb/hr; (lb/MMBtu) (MMBtu/hr) = lb/hr
(lb/hr) (hrs/yr) (ton/2000 lb) = tons/yr

1. Information from manufacturer's specification sheet.

2. SO_2 emissions based on AP-42 Section 3.2, Table 3.2-3 footnote e (7/00), which is based on 100% conversion of sulfur to SO_2 at 2,000 grains/MMscf. Sulfur content of fuel at the TAT-Blue Buttes Compressor Station assumed to be 2,000 grains/MMscf.

3. Per NSPS JJJJ Table 1, footnote d, formaldehyde is not included in the VOC emission factors in Table 1. As such, the formaldehyde emission factor of 0.05 g/bhp-hr from the manufacturer's specification sheet is added to the VOC emission factor in order to represent total VOCs.

4. Emission factor for TSP, PM_{10} and $PM_{2.5}$ from AP-42 Section 3.2, Table 3.2-3 (7/00); includes PM_{10}/$PM_{2.5}$ filterable (9.50e-03 lb/MMBtu) and PM condensable (9.91e-3 lb/MMBtu) = 0.01941 lb/MMBtu.

HAP	Rich Burn Emission Factors [1] (lb/MMBtu)	HAP Emissions	
		(lb/hr)	(tpy)
1,1,2,2-Tetrachloroethane	2.53E-05	2.95E-04	1.29E-03
1,1,2-Trichloroethane	1.53E-05	1.79E-04	7.82E-04
1,3-Butadiene	6.63E-04	7.74E-03	0.03
1,3-Dichloropropene	1.27E-05	1.48E-04	6.49E-04
Acetaldehyde	2.79E-03	0.03	0.14
Acrolein	2.63E-03	0.03	0.13
Benzene	1.58E-03	0.02	0.08
Carbon Tetrachloride	1.77E-05	2.07E-04	9.05E-04
Chlorobenzene	1.29E-05	1.51E-04	6.59E-04
Chloroform	1.37E-05	1.60E-04	7.00E-04
Ethylbenzene	2.48E-05	2.89E-04	1.27E-03
Ethylene Dibromide	2.13E-05	2.49E-04	1.09E-03
Formaldehyde [2]	-	0.15	0.67
Methanol	3.06E-03	0.04	0.16
Methylene Chloride	4.12E-05	4.81E-04	2.11E-03
Naphthalene	9.71E-05	1.13E-03	4.96E-03
PAH	1.41E-04	1.65E-03	7.21E-03
Styrene	1.19E-05	1.39E-04	6.08E-04
Toluene	5.58E-04	6.51E-03	0.03
Vinyl Chloride	7.18E-06	8.38E-05	3.67E-04
Xylene	1.95E-04	2.28E-03	9.97E-03
Total HAP Emissions		**0.29**	**1.28**

1. HAP emission factors from AP-42 Section 3.2, Table 3.2-3 (7/00).

2. Formaldehyde emission factor from manufacturer specification sheet:
0.05 [g/bhp-hr] * 1,380 [bhp] / 453.59 [g/lb] = 0.15 [lb/hr]

Targa Badlands LLC - TAT-Blue Buttes Compressor Station
Waukesha L5794GSI Compressor - IC Engine Emissions Calculations

TAT-Blue Buttes Compressor Station Engine Data (EU 4/EPN 4)					
IC Engine Make [1]	Waukesha		Higher Heating Value [1]	1,035.2	Btu/scf
IC Engine Model [1]	L5794GSI		Lower Heating Value [1]	935.8	Btu/scf
Power Rating [1]	1,380	bhp	Sulfur Content [2]	2.00E-03	gr/scf
Heat Rate (HHV) [1]	8,456	Btu/bhp-hr	Fuel Consumption [1]	11,280	scf/hr
Duty (input)	11.67	MMBtu/hr	Fuel Consumption	109.24	MMscf/yr
Hours per Year	8,760	hr/yr	Exhaust Gas Flow [1]	6,379	acfm

Criteria Pollutant	Emission Factors		Emissions (lb/hr)	Emissions (tpy)	Source of Emission Factors [1,2]
NO_x	1.00	g/bhp-hr	3.04	13.33	NSPS JJJJ, Table 1
CO	2.00	g/bhp-hr	6.08	26.65	NSPS JJJJ, Table 1
VOC [3]	0.75	g/bhp-hr	2.28	9.99	NSPS JJJJ, Table 1; Manufacturer
Formaldehyde	0.05	g/bhp-hr	0.15	0.67	Manufacturer
SO_2 [2]	5.88E-04	lb/MMBtu	6.86E-03	0.03	AP-42 Tbl 3.2-3; 4SRB (7/00)
PM_{10} [4]	0.019	lb/MMBtu	0.23	0.99	AP-42 Tbl 3.2-3; 4SRB (7/00)
$PM_{2.5}$ [4]	0.019	lb/MMBtu	0.23	0.99	AP-42 Tbl 3.2-3; 4SRB (7/00)
TSP	0.019	lb/MMBtu	0.23	0.99	AP-42 Tbl 3.2-3; 4SRB (7/00)
Total HAP	-	-	0.29	1.28	AP-42 Tbl 3.2-3; 4SRB (7/00); Manufacturer

GHG	Emission Factors		Emissions (lb/hr)	Emissions (tpy)	Source of Emission Factors [1,2]
CO_2	473.00	g/bhp-hr	1,439.05	6,303.05	Manufacturer
CH_4	1.55	g/bhp-hr	4.72	20.65	Manufacturer
CO_2e	514.00	g/bhp-hr	1,563.79	6,849.40	Manufacturer

Sample Calculations:

(bhp) (Btu/bhp-hr) (MM/10^6) = MMBtu/hr; (MMBtu/hr) / (Btu/scf) (10^6/MM) = scf/hr
(g/bhp-hr) (bhp) (lb/453.59 g) = lb/hr; (lb/MMBtu) (MMBtu/hr) = lb/hr
(lb/hr) (hrs/yr) (ton/2000 lb) = tons/yr

1. Information from manufacturer's specification sheet.

2. SO_2 emissions based on AP-42 Section 3.2, Table 3.2-3 footnote e (7/00), which is based on 100% conversion of sulfur to SO_2 at 2,000 grains/MMscf. Sulfur content of fuel at the TAT-Blue Buttes Compressor Station assumed to be 2,000 grains/MMscf.

3. Per NSPS JJJJ Table 1, footnote d, formaldehyde is not included in the VOC emission factors in Table 1. As such, the formaldehyde emission factor of 0.05 g/bhp-hr from the manufacturer's specification sheet is added to the VOC emission factor in order to represent total VOCs.

4. Emission factor for TSP, PM_{10} and $PM_{2.5}$ from AP-42 Section 3.2, Table 3.2-3 (7/00); includes PM_{10}/$PM_{2.5}$ filterable (9.50e-03 lb/MMBtu) and PM condensable (9.91e-3 lb/MMBtu) = 0.01941 lb/MMBtu.

HAP	Rich Burn Emission Factors [1] (lb/MMBtu)	HAP Emissions	
		(lb/hr)	(tpy)
1,1,2,2-Tetrachloroethane	2.53E-05	2.95E-04	1.29E-03
1,1,2-Trichloroethane	1.53E-05	1.79E-04	7.82E-04
1,3-Butadiene	6.63E-04	7.74E-03	0.03
1,3-Dichloropropene	1.27E-05	1.48E-04	6.49E-04
Acetaldehyde	2.79E-03	0.03	0.14
Acrolein	2.63E-03	0.03	0.13
Benzene	1.58E-03	0.02	0.08
Carbon Tetrachloride	1.77E-05	2.07E-04	9.05E-04
Chlorobenzene	1.29E-05	1.51E-04	6.59E-04
Chloroform	1.37E-05	1.60E-04	7.00E-04
Ethylbenzene	2.48E-05	2.89E-04	1.27E-03
Ethylene Dibromide	2.13E-05	2.49E-04	1.09E-03
Formaldehyde [2]	-	0.15	0.67
Methanol	3.06E-03	0.04	0.16
Methylene Chloride	4.12E-05	4.81E-04	2.11E-03
Naphthalene	9.71E-05	1.13E-03	4.96E-03
PAH	1.41E-04	1.65E-03	7.21E-03
Styrene	1.19E-05	1.39E-04	6.08E-04
Toluene	5.58E-04	6.51E-03	0.03
Vinyl Chloride	7.18E-06	8.38E-05	3.67E-04
Xylene	1.95E-04	2.28E-03	9.97E-03
Total HAP Emissions		**0.29**	**1.28**

1. HAP emission factors from AP-42 Section 3.2, Table 3.2-3 (7/00).

2. Formaldehyde emission factor from manufacturer specification sheet:
0.05 [g/bhp-hr] * 1,380 [bhp] / 453.59 [g/lb] = 0.15 [lb/hr]

Targa Badlands LLC - TAT-Blue Buttes Compressor Station
Waukesha L5794GSI Compressor - IC Engine Emissions Calculations

TAT-Blue Buttes Compressor Station Engine Data (EU 5/EPN 5)					
IC Engine Make [1]	Waukesha		Higher Heating Value [1]	1,035.2	Btu/scf
IC Engine Model [1]	L5794GSI		Lower Heating Value [1]	935.8	Btu/scf
Power Rating [1]	1,380	bhp	Sulfur Content [2]	2.00E-03	gr/scf
Heat Rate (HHV) [1]	8,456	Btu/bhp-hr	Fuel Consumption [1]	11,280	scf/hr
Duty (input)	11.67	MMBtu/hr	Fuel Consumption	109.24	MMscf/yr
Hours per Year	8,760	hr/yr	Exhaust Gas Flow [1]	6,379	acfm

Criteria Pollutant	Emission Factors		Emissions (lb/hr)	Emissions (tpy)	Source of Emission Factors [1,2]
NO_x	1.00	g/bhp-hr	3.04	13.33	NSPS JJJJ, Table 1
CO	2.00	g/bhp-hr	6.08	26.65	NSPS JJJJ, Table 1
VOC [3]	0.75	g/bhp-hr	2.28	9.99	NSPS JJJJ, Table 1; Manufacturer
Formaldehyde	0.05	g/bhp-hr	0.15	0.67	Manufacturer
SO_2 [2]	5.88E-04	lb/MMBtu	6.86E-03	0.03	AP-42 Tbl 3.2-3; 4SRB (7/00)
PM_{10} [4]	0.019	lb/MMBtu	0.23	0.99	AP-42 Tbl 3.2-3; 4SRB (7/00)
$PM_{2.5}$ [4]	0.019	lb/MMBtu	0.23	0.99	AP-42 Tbl 3.2-3; 4SRB (7/00)
TSP	0.019	lb/MMBtu	0.23	0.99	AP-42 Tbl 3.2-3; 4SRB (7/00)
Total HAP	-	-	0.29	1.28	AP-42 Tbl 3.2-3; 4SRB (7/00); Manufacturer

GHG	Emission Factors		Emissions (lb/hr)	Emissions (tpy)	Source of Emission Factors [1,2]
CO_2	473.00	g/bhp-hr	1,439.05	6,303.05	Manufacturer
CH_4	1.55	g/bhp-hr	4.72	20.65	Manufacturer
CO_2e	514.00	g/bhp-hr	1,563.79	6,849.40	Manufacturer

Sample Calculations:

(bhp) (Btu/bhp-hr) (MM/10^6) = MMBtu/hr; (MMBtu/hr) / (Btu/scf) (10^6/MM) = scf/hr
(g/bhp-hr) (bhp) (lb/453.59 g) = lb/hr; (lb/MMBtu) (MMBtu/hr) = lb/hr
(lb/hr) (hrs/yr) (ton/2000 lb) = tons/yr

1. Information from manufacturer's specification sheet.
2. SO_2 emissions based on AP-42 Section 3.2, Table 3.2-3 footnote e (7/00), which is based on 100% conversion of sulfur to SO_2 at 2,000 grains/MMscf. Sulfur content of fuel at the TAT-Blue Buttes Compressor Station assumed to be 2,000 grains/MMscf.
3. Per NSPS JJJJ Table 1, footnote d, formaldehyde is not included in the VOC emission factors in Table 1. As such, the formaldehyde emission factor of 0.05 g/bhp-hr from the manufacturer's specification sheet is added to the VOC emission factor in order to represent total VOCs.
4. Emission factor for TSP, PM_{10} and $PM_{2.5}$ from AP-42 Section 3.2, Table 3.2-3 (7/00); includes PM_{10}/$PM_{2.5}$ filterable (9.50e-03 lb/MMBtu) and PM condensable (9.91e-3 lb/MMBtu) = 0.01941 lb/MMBtu.

HAP	Rich Burn Emission Factors [1] (lb/MMBtu)	HAP Emissions	
		(lb/hr)	(tpy)
1,1,2,2-Tetrachloroethane	2.53E-05	2.95E-04	1.29E-03
1,1,2-Trichloroethane	1.53E-05	1.79E-04	7.82E-04
1,3-Butadiene	6.63E-04	7.74E-03	0.03
1,3-Dichloropropene	1.27E-05	1.48E-04	6.49E-04
Acetaldehyde	2.79E-03	0.03	0.14
Acrolein	2.63E-03	0.03	0.13
Benzene	1.58E-03	0.02	0.08
Carbon Tetrachloride	1.77E-05	2.07E-04	9.05E-04
Chlorobenzene	1.29E-05	1.51E-04	6.59E-04
Chloroform	1.37E-05	1.60E-04	7.00E-04
Ethylbenzene	2.48E-05	2.89E-04	1.27E-03
Ethylene Dibromide	2.13E-05	2.49E-04	1.09E-03
Formaldehyde [2]	-	0.15	0.67
Methanol	3.06E-03	0.04	0.16
Methylene Chloride	4.12E-05	4.81E-04	2.11E-03
Naphthalene	9.71E-05	1.13E-03	4.96E-03
PAH	1.41E-04	1.65E-03	7.21E-03
Styrene	1.19E-05	1.39E-04	6.08E-04
Toluene	5.58E-04	6.51E-03	0.03
Vinyl Chloride	7.18E-06	8.38E-05	3.67E-04
Xylene	1.95E-04	2.28E-03	9.97E-03
Total HAP Emissions		**0.29**	**1.28**

1. HAP emission factors from AP-42 Section 3.2, Table 3.2-3 (7/00).

2. Formaldehyde emission factor from manufacturer specification sheet:
0.05 [g/bhp-hr] * 1,380 [bhp] / 453.59 [g/lb] = 0.15 [lb/hr]

Targa Badlands LLC - TAT-Blue Buttes Compressor Station
Waukesha L5794GSI Compressor - IC Engine Emissions Calculations

TAT-Blue Buttes Compressor Station Engine Data (EU 6/EPN 6)					
IC Engine Make [1]	Waukesha		Higher Heating Value [1]	1,035.2	Btu/scf
IC Engine Model [1]	L5794GSI		Lower Heating Value [1]	935.8	Btu/scf
Power Rating [1]	1,380	bhp	Sulfur Content [2]	2.00E-03	gr/scf
Heat Rate (HHV) [1]	8,456	Btu/bhp-hr	Fuel Consumption [1]	11,280	scf/hr
Duty (input)	11.67	MMBtu/hr	Fuel Consumption	109.24	MMscf/yr
Hours per Year	8,760	hr/yr	Exhaust Gas Flow [1]	6,379	acfm

Criteria Pollutant	Emission Factors		Emissions (lb/hr)	Emissions (tpy)	Source of Emission Factors [1,2]
NO_x	1.00	g/bhp-hr	3.04	13.33	NSPS JJJJ, Table 1
CO	2.00	g/bhp-hr	6.08	26.65	NSPS JJJJ, Table 1
VOC [3]	0.75	g/bhp-hr	2.28	9.99	NSPS JJJJ, Table 1; Manufacturer
Formaldehyde	0.05	g/bhp-hr	0.15	0.67	Manufacturer
SO_2 [2]	5.88E-04	lb/MMBtu	6.86E-03	0.03	AP-42 Tbl 3.2-3; 4SRB (7/00)
PM_{10} [4]	0.019	lb/MMBtu	0.23	0.99	AP-42 Tbl 3.2-3; 4SRB (7/00)
$PM_{2.5}$ [4]	0.019	lb/MMBtu	0.23	0.99	AP-42 Tbl 3.2-3; 4SRB (7/00)
TSP	0.019	lb/MMBtu	0.23	0.99	AP-42 Tbl 3.2-3; 4SRB (7/00)
Total HAP	-	-	0.29	1.28	AP-42 Tbl 3.2-3; 4SRB (7/00); Manufacturer

GHG	Emission Factors		Emissions (lb/hr)	Emissions (tpy)	Source of Emission Factors [1,2]
CO_2	473.00	g/bhp-hr	1,439.05	6,303.05	Manufacturer
CH_4	1.55	g/bhp-hr	4.72	20.65	Manufacturer
CO_2e	514.00	g/bhp-hr	1,563.79	6,849.40	Manufacturer

Sample Calculations:

(bhp) (Btu/bhp-hr) (MM/10^6) = MMBtu/hr; (MMBtu/hr) / (Btu/scf) (10^6/MM) = scf/hr
(g/bhp-hr) (bhp) (lb/453.59 g) = lb/hr; (lb/MMBtu) (MMBtu/hr) = lb/hr
(lb/hr) (hrs/yr) (ton/2000 lb) = tons/yr

1. Information from manufacturer's specification sheet.
2. SO_2 emissions based on AP-42 Section 3.2, Table 3.2-3 footnote e (7/00), which is based on 100% conversion of sulfur to SO_2 at 2,000 grains/MMscf. Sulfur content of fuel at the TAT-Blue Buttes Compressor Station assumed to be 2,000 grains/MMscf.
3. Per NSPS JJJJ Table 1, footnote d, formaldehyde is not included in the VOC emission factors in Table 1. As such, the formaldehyde emission factor of 0.05 g/bhp-hr from the manufacturer's specification sheet is added to the VOC emission factor in order to represent total VOCs.
4. Emission factor for TSP, PM_{10} and $PM_{2.5}$ from AP-42 Section 3.2, Table 3.2-3 (7/00); includes PM_{10}/$PM_{2.5}$ filterable (9.50e-03 lb/MMBtu) and PM condensable (9.91e-3 lb/MMBtu) = 0.01941 lb/MMBtu.

HAP	Rich Burn Emission Factors [1] (lb/MMBtu)	HAP Emissions	
		(lb/hr)	(tpy)
1,1,2,2-Tetrachloroethane	2.53E-05	2.95E-04	1.29E-03
1,1,2-Trichloroethane	1.53E-05	1.79E-04	7.82E-04
1,3-Butadiene	6.63E-04	7.74E-03	0.03
1,3-Dichloropropene	1.27E-05	1.48E-04	6.49E-04
Acetaldehyde	2.79E-03	0.03	0.14
Acrolein	2.63E-03	0.03	0.13
Benzene	1.58E-03	0.02	0.08
Carbon Tetrachloride	1.77E-05	2.07E-04	9.05E-04
Chlorobenzene	1.29E-05	1.51E-04	6.59E-04
Chloroform	1.37E-05	1.60E-04	7.00E-04
Ethylbenzene	2.48E-05	2.89E-04	1.27E-03
Ethylene Dibromide	2.13E-05	2.49E-04	1.09E-03
Formaldehyde [2]	-	0.15	0.67
Methanol	3.06E-03	0.04	0.16
Methylene Chloride	4.12E-05	4.81E-04	2.11E-03
Naphthalene	9.71E-05	1.13E-03	4.96E-03
PAH	1.41E-04	1.65E-03	7.21E-03
Styrene	1.19E-05	1.39E-04	6.08E-04
Toluene	5.58E-04	6.51E-03	0.03
Vinyl Chloride	7.18E-06	8.38E-05	3.67E-04
Xylene	1.95E-04	2.28E-03	9.97E-03
Total HAP Emissions		**0.29**	**1.28**

1. HAP emission factors from AP-42 Section 3.2, Table 3.2-3 (7/00).

2. Formaldehyde emission factor from manufacturer specification sheet:
0.05 [g/bhp-hr] * 1,380 [bhp] / 453.59 [g/lb] = 0.15 [lb/hr]

Targa Badlands LLC - TAT-Blue Buttes Compressor Station
Produced Water Tank Emission Calculations

TAT-Blue Buttes Compressor Station Tank Data (EU 7/EPN 7)		
Emission Source	Produced Water Tank	
Source Type	Tank	
Tank Volume	400	bbl
Annual Throughput [1]	30,075	bbl/yr
VOC Working Losses [1,2]	4.05E-03	lb/hr
VOC Breathing Losses [1,2]	1.19E-03	lb/hr
Average Hourly VOC Flash Losses [1,2]	-	lb/hr
Average Annual VOC Flash Losses [1,2]	-	tpy
Total Hourly VOC Uncontrolled Emissions	5.25E-03	lb/hr
Total Annual VOC Uncontrolled Emissions	0.02	tpy

Pollutant	Weight Percent of VOC Losses				Control Efficiency [4] (%)	Uncontrolled Produced Water Tank Emissions		Controlled Produced Water Tank Emissions	
	Working [2]	Breathing [2]	Flash [2] (hourly)	Flash [2] (annual)		(lb/hr)	(tpy)	(lb/hr)	(tpy)
VOC [3]	100.00%	100.00%	100.00%	100.00%	0%	5.25E-03	0.02	5.25E-03	0.02
n-Hexane	3.75%	3.75%	11.75%	11.75%	0%	1.97E-04	8.62E-04	1.97E-04	8.62E-04
Benzene	0.17%	0.17%	0.89%	0.89%	0%	9.10E-06	3.98E-05	9.10E-06	3.98E-05
Toluene	0.15%	0.15%	2.79%	2.79%	0%	8.05E-06	3.52E-05	8.05E-06	3.52E-05
Ethylbenzene	0.01%	0.01%	0.77%	0.77%	0%	7.31E-07	3.20E-06	7.31E-07	3.20E-06
Xylenes	0.02%	0.02%	1.34%	1.34%	0%	1.13E-06	4.94E-06	1.13E-06	4.94E-06
2,2,4-TMP	0.19%	0.19%	1.90%	1.90%	0%	9.91E-06	4.34E-05	9.91E-06	4.34E-05
Total HAP	4.30%	4.30%	19.45%	19.45%	0%	2.26E-04	9.88E-04	2.26E-04	9.88E-04

1. Emissions for produced water were calculated using the properties of pure condensate and multiplying by a factor of 2% (the amount of VOC modeled in the produced water liquid stream) to account for the condensate in the produced water, and using an 82.4 bbl/day throughput.

2. Working, breathing, and flash losses and weight percent based off of hourly and annual ProMax results, which are based on the ProMax files from the Smokey Compressor Station. Hourly emissions assumed to be annual emissions distributed evenly throughout 8,760 hours of operation.

3. VOC weight percentage assumed to be 100% for working, breathing, and flash losses.

4. The produced water tank emissions are routed to the vapor combustor. However, as uncontrolled emissions are less than 6 tpy of VOC, controls are not required by NSPS OOOOa. As such, no control efficiency is accounted for.

GHG	Losses Source (lb/hr)				Produced Water Tank Emissions	
	Working [1, 2]	Breathing [1, 2]	Flash [1, 2] (hourly)	Flash [1, 2] (annual)	(lb/hr)	(tpy)
CO_2	-	-	-	-	-	-
CH_4	-	-	-	-	-	-
N_2O	-	-	-	-	-	-
CO_2e [3]	**-**	**-**	**-**	**-**	**-**	**-**

1. Working, breathing, and flash losses and weight percent based off of hourly and annual ProMax results, which are based on the ProMax files from the Smokey Compressor Station. Hourly emissions assumed to be annual emissions distributed evenly throughout 8,760 hours of operation.

2. Emissions for produced water were calculated using the properties of pure condensate and multiplying by a factor of 2% (the amount of VOC modeled in the produced water liquid stream) to account for the condensate in the produced water, and using an 82.4 bbl/day throughput.

3. Per 40 CFR 98 - Mandatory Greenhouse Gas Reporting, Subpart A, Table A-1. Total CO_2e emissions are calculated based on the following Global Warming Potentials (GWPs).

GHG	GWP
CO_2	1
CH_4	25
N_2O	298

Targa Badlands LLC - TAT-Blue Buttes Compressor Station
Loading Losses Emission Calculations

Equation [1]:

$$L_L = 12.46 \frac{S\,P\,M}{T}$$

Variables [1]:

L_L - Loading Losses (lbs/1,000 gal loaded)
S - Saturation Factor from AP-42 Section 5.2, Table 5.2-1 (6/08)
P - True Vapor Pressure of Loaded Liquid (psia)
M - Molecular Weight of Vapor (lb/lb mol)
T- Temperature of Bulk Liquid (°R = [°F + 460])

TAT-Blue Buttes Compressor Station Vapor Loading Losses Data (EU 8/EPN 8, EU 13/EPN 13)									
EPN	Material Loaded	Loading Method	S	P_{max} [2] (psia)	M (lb/lbmol)	T [3] (°R)	L_L (lbs/1,000 gal)	Max Hourly Throughput [4] (gal/hr)	Max Hourly Emissions [5] (lb/hr)
8	Produced Water	Submerged	0.60	14.00	41.32	499.55	8.66	10,500	1.95
13	Condensate	Submerged	0.60	14.00	41.32	499.55	8.66	10,500	90.91

EPN	Material Loaded	Loading Method	S	P_{max} [2] (psia)	M (lb/lbmol)	T [3] (°R)	L_L (lbs/1,000 gal)	Total Annual Throughput [4] (gallons/yr)	Annual Emissions [5] (tpy)
8	Produced Water	Submerged	0.60	14.00	41.32	499.55	8.66	1,263,161	0.12
13	Condensate	Submerged	0.60	14.00	41.32	499.55	8.66	3,912,523	16.94

1. Loading Loss Equation and Variables are from AP-42 Section 5.2 (6/08), Transportation and Marketing of Petroleum Liquids.
2. The vapor pressure is based off of the bubble pressure from the ProMax runs provided by Targa on 4/26/2018.
3. For annual calculations, the temperature from the ProMax run was used. Hourly data assumed equal to annual.
4. The maximum hourly throughput is based on the loading of one 250 barrel tank truck in one-hour. The total annual throughput is based on the total annual throughput for condensate and produced water storage tanks.
5. Loading emissions for produced water were calculated using the properties of pure condensate and multiplying by a factor of 2% (the amount of VOC modeled in the produced water liquid stream) to account for the condensate in the produced water.

Pollutant	PW Vapor Weight % [1]	Condensate Vapor Weight % [1]	Annual PW EU 8 (tpy)	Annual Condensate EU 13 (tpy)	HAP
Benzene	0.15%	0.15%	1.72E-04	0.02	Yes
Toluene	0.12%	0.12%	1.39E-04	0.02	Yes
Ethylbenzene	0.01%	0.01%	1.10E-05	1.59E-03	Yes
m-Xylene	0.00%	0.00%	2.05E-06	2.96E-04	Yes
p-Xylene	0.01%	0.01%	1.35E-05	1.95E-03	Yes
o-Xylene	0.00%	0.002%	2.55E-06	3.69E-04	Yes
n-Hexane	1.9%	1.92%	2.25E-03	0.32	Yes
2,2,4-TMP	0.09%	0.09%	1.09E-04	0.02	Yes

1. Vapor weight percent based on annual ProMax results, which are based on the ProMax files from the Smokey Compressor Station. Hourly emissions assumed to be annual emissions distributed evenly throughout 8,760 hours of operation.

GHG	PW Vapor Weight % [1]	Condensate Vapor Weight % [1]	Annual PW EU 8 (tpy)	Annual Condensate EU 13 (tpy)
CO_2	-	-	-	-
CH_4	4.56%	4.56%	5.35E-03	0.77
N_2O	-	-	-	-
CO_2e [2]	**-**	**-**	**0.13**	**19.32**

1. Vapor weight percent based on annual ProMax results, which are based on the ProMax files from the Clark's Creek Compressor Station.

2. Per 40 CFR 98 - Mandatory Greenhouse Gas Reporting, Subpart A, Table A-1. Total CO_2e emissions are calculated based on the following Global Warming Potentials (GWPs).

GHG	GWP
CO_2	1
CH_4	25
N_2O	298

Targa Badlands LLC - TAT-Blue Buttes Compressor Station
PIG Receiving Emission Calculations

TAT-Blue Buttes Compressor Station Venting Data (EPN 9)				
Emission Source	PIG Receiver			
Source Type	High Pressure Natural Gas Venting		Low Pressure Natural Gas Venting	
Pipeline Diameter [1]	8.00	in	16.00	in
Receiver Volume [2]	10.91	cubic feet	35.34	cubic feet
Trap Operating Temperature [3]	44.00	°F	44.00	°F
Trap Operating Pressure [3]	17.00	psig	17.00	psig
Blowdown Volume [4]	24.27	scf/event	78.64	scf/event
Venting Events per Year per Trap [5]	20	events/trap/yr	364	events/trap/yr
Gas Molecular Weight [3]	23.94	lb/mole	23.94	lb/mole
Number of Traps	1		1	

Natural Gas											
Pollutant	**Weight Percent [3]**	**8-Inch Emission Factor [6] (lb/event)**	**16-Inch Emission Factor [6] (lb/event)**	**Emissions From One 8-Inch Trap [7,8]**		**Emissions From All 8-Inch Traps [7,8]**		**Emissions From One 16-Inch Trap [7,8]**		**Emissions From All 16-Inch Traps [7,8]**	
				(lb/yr)	**(tpy)**	**(lb/yr)**	**(tpy)**	**(lb/yr)**	**(tpy)**	**(lb/yr)**	**(tpy)**
VOC	27.80%	0.43	1.38	8.52	4.26E-03	8.52	4.26E-03	502.53	0.25	502.53	0.25
CO_2	1.45%	0.02	0.07	0.45	2.23E-04	0.45	2.23E-04	26.26	0.01	26.26	0.01
Methane	42.11%	0.65	2.09	12.91	6.45E-03	12.91	6.45E-03	761.14	0.38	761.14	0.38
n-Hexane [9]	0.15%	2.26E-03	7.33E-03	0.05	2.26E-05	0.05	2.26E-05	2.67	1.33E-03	2.67	1.33E-03
Benzene	-	-	-	-	-	-	-	-	-	-	-
Toluene	0.01%	1.18E-04	3.82E-04	2.36E-03	1.18E-06	2.36E-03	1.18E-06	0.14	6.96E-05	0.14	6.96E-05
Ethylbenzene	-	-	-	-	-	-	-	-	-	-	-
Xylenes	0.01%	1.36E-04	4.41E-04	2.72E-03	1.36E-06	2.72E-03	1.36E-06	0.16	8.02E-05	0.16	8.02E-05
2,2,4-TMP	0.03%	5.12E-04	1.66E-03	0.01	5.12E-06	0.01	5.12E-06	0.60	3.02E-04	0.60	3.02E-04

1. Based on pigging information provided by Targa on 4/12/18.
2. Trap volume calculated as a cylinder assuming the diameter of the trap is 2 inches larger than the pipeline and is 20 feet in length. Trap Volume (cubic feet) = π * (20 feet) (((Pipeline Diameter, inches) + 2 inches) / 24) ^{2}.
3. Based on a representative Inlet Gas Analysis Stream from the Blue Buttes facility (sampled 7/12/2016). Sample provided by Targa on 5/2/2018.
4 Blowdown Volume (scf/event) = (Trap Volume, Cubic Feet) * ((Trap Op Press, psig) + (14.7 psia)) * (520 Rankine) / ((Trap Op Temp, F) + (460 Rankine)) / (14.7 psia).
5. Number of pigging events provided by Targa on 3/22/18.
6. Emission factor (lb/event) = (Blowdown Volume, scf/event) / (379 scf/mole) * (Gas MW, lb/mole) * (Weight Percent).
7. Annual Emission Rate (lb/yr) = (Emission Factor, lb/event) * (events/trap/yr) * (number of traps).
8. Annual Emission Rate (tpy) = (Annual Emission Rate, lb/yr) / (2,000 lb/ton).
9. Conservatively assumes analysis output of "hexane plus" is n-hexane.

Targa Badlands LLC - TAT-Blue Buttes Compressor Station
PIG Launching Emission Calculations

TAT-Blue Buttes Compressor Station Venting Data (EPN 9)				
Emission Source	PIG Launcher			
Source Type	High Pressure Natural Gas Venting		Low Pressure Natural Gas Venting	
Pipeline Diameter [1]	8.00	in	16.00	in
Receiver Volume [2]	10.91	cubic feet	35.34	cubic feet
Trap Operating Temperature [3]	44.00	°F	44.00	°F
Trap Operating Pressure [3]	17.00	psig	17.00	psig
Blowdown Volume [4]	24.27	scf/event	78.64	scf/event
Venting Events per Year per Trap [5]	20	events/trap/yr	364	events/trap/yr
Gas Molecular Weight [3]	23.94	lb/mole	23.94	lb/mole
Number of Traps	1		1	

Natural Gas											
Pollutant	**Weight Percent [3]**	**8-Inch Emission Factor [6] (lb/event)**	**16-Inch Emission Factor [6] (lb/event)**	**Emissions From One 8-Inch Trap [7,8]**		**Emissions From All 8-Inch Traps [7,8]**		**Emissions From One 16-Inch Trap [7,8]**		**Emissions From All 16-Inch Traps [7,8]**	
				(lb/yr)	**(tpy)**	**(lb/yr)**	**(tpy)**	**(lb/yr)**	**(tpy)**	**(lb/yr)**	**(tpy)**
VOC	27.80%	0.43	1.38	8.52	4.26E-03	8.52	4.26E-03	502.53	0.25	502.53	0.25
CO_2	1.45%	0.02	0.07	0.45	2.23E-04	0.45	2.23E-04	26.26	0.01	26.26	0.01
Methane	42.11%	0.65	2.09	12.91	6.45E-03	12.91	6.45E-03	761.14	0.38	761.14	0.38
n-Hexane [9]	0.15%	2.26E-03	7.33E-03	0.05	2.26E-05	0.05	2.26E-05	2.67	1.33E-03	2.67	1.33E-03
Benzene	-	-	-	-	-	-	-	-	-	-	-
Toluene	0.01%	1.18E-04	3.82E-04	2.36E-03	1.18E-06	2.36E-03	1.18E-06	0.14	6.96E-05	0.14	6.96E-05
Ethylbenzene	-	-	-	-	-	-	-	-	-	-	-
Xylenes	0.01%	1.36E-04	4.41E-04	2.72E-03	1.36E-06	2.72E-03	1.36E-06	0.16	8.02E-05	0.16	8.02E-05
2,2,4-TMP	0.03%	5.12E-04	1.66E-03	0.01	5.12E-06	0.01	5.12E-06	0.60	3.02E-04	0.60	3.02E-04

1. Based on pigging information provided by Targa on 4/12/18.
2. Trap volume calculated as a cylinder assuming the diameter of the trap is 2 inches larger than the pipeline and is 20 feet in length. Trap Volume (cubic feet) = π * (20 feet) (((Pipeline Diameter, inches) + 2 inches) / 24) ^{2}.
3. Based on a representative Inlet Gas Analysis Stream from the Blue Buttes facility (sampled 7/12/2016). Sample provided by Targa on 5/2/2018.
4 Blowdown Volume (scf/event) = (Trap Volume, Cubic Feet) * ((Trap Op Press, psig) + (14.7 psia)) * (520 Rankine) / ((Trap Op Temp, F) + (460 Rankine)) / (14.7 psia).
5. Number of pigging events provided by Targa on 3/22/18.
6. Emission factor (lb/event) = (Blowdown Volume, scf/event) / (379 scf/mole) * (Gas MW, lb/mole) * (Weight Percent).
7. Annual Emission Rate (lb/yr) = (Emission Factor, lb/event) * (events/trap/yr) * (number of traps).
8. Annual Emission Rate (tpy) = (Annual Emission Rate, lb/yr) / (2,000 lb/ton).
9. Conservatively assumes analysis output of "hexane plus" is n-hexane.

Targa Badlands LLC - TAT-Blue Buttes Compressor Station
Fugitive Emissions Calculations

TAT-Blue Buttes Compressor Station Fugitives Data (EU 10/EPN 10)																															
					Emissions																										
					VOC [3,4]			n-Hexane [3,4]			Benzene [3,4]			Toluene [3,4]			Ethylbenzene [3,4]			Xylene [3,4]			2,2,4-TMP [3,4]			Methanol [3,4]		
Service	Service Type	Equipment Type	Factors [1] (kg/hr/ source)	Count [2]	(wt %)	(lb/hr)	(tpy)	(wt %)	(lb/hr)	(tpy)	(wt %)	(lb/hr)	(tpy)	(wt %)	(lb/hr)	(tpy)	(wt %)	(lb/hr)	(tpy)	(wt %)	(lb/hr)	(tpy)	(wt %)	(lb/hr)	(tpy)	(wt %)	(lb/hr)	(tpy)
Gas	Field gas [5]	Valves	4.5E-03	915	27.80%	2.52	11.05	0.15%	0.01	0.06	0.00%	<0.01	<0.01	0.01%	<0.01	<0.01	0.00%	<0.01	<0.01	0.01%	<0.01	<0.01	0.03%	<0.01	0.01	0.00%	0.00	0.00
		Pump Seals	2.4E-03	0		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00
		Others	8.8E-03	44		0.23	1.03		<0.01	<0.01		<0.01	<0.01		<0.01	<0.01		<0.01	<0.01		<0.01	<0.01		<0.01	<0.01		0.00	0.00
		Connectors	2.0E-04	4,544		0.56	2.44		<0.01	0.01		<0.01	<0.01		<0.01	<0.01		<0.01	<0.01		<0.01	<0.01		<0.01	<0.01		0.00	0.00
		Flanges	3.9E-04	639		0.15	0.67		<0.01	<0.01		<0.01	<0.01		<0.01	<0.01		<0.01	<0.01		<0.01	<0.01		<0.01	<0.01		0.00	0.00
		Open-Ended	2.0E-03	0		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00
Light Oil	Condensate [6]	Valves	2.5E-03	320	99.66%	1.76	7.70	12%	0.21	0.90	0.89%	0.02	0.07	2.78%	0.05	0.21	0.77%	0.01	0.06	1.34%	0.02	0.10	1.89%	0.03	0.15	0.00%	0.00	0.00
		Pump Seals	1.3E-02	6		0.17	0.75		0.02	0.09		<0.01	<0.01		<0.01	0.02		<0.01	<0.01		<0.01	0.01		<0.01	0.01		0.00	0.00
		Others	7.5E-03	3		0.05	0.22		<0.01	0.03		<0.01	<0.01		<0.01	<0.01		<0.01	<0.01		<0.01	<0.01		<0.01	<0.01		0.00	0.00
		Connectors	2.1E-04	2,374		1.10	4.80		0.13	0.56		<0.01	0.04		0.03	0.13		<0.01	0.04		0.01	0.06		0.02	0.09		0.00	0.00
		Flanges	1.1E-04	222		0.05	0.23		<0.01	0.03		<0.01	<0.01		<0.01	<0.01		<0.01	<0.01		<0.01	<0.01		<0.01	<0.01		0.00	0.00
		Open-Ended	1.4E-03	0		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00
	Methanol [7]	Valves	2.5E-03	8	100.00%	0.04	0.19	0.00%	0.00	0.00	0.00%	0.00	0.00	0.00%	0.00	0.00	0.00%	0.00	0.00	0.00%	0.00	0.00	0.00%	0.00	0.00	100.00%	0.04	0.19
		Pump Seals	1.3E-02	2		0.06	0.25		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.06	0.25
		Others	7.5E-03	0		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00
		Connectors	2.1E-04	112		0.05	0.23		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.05	0.23
		Flanges	1.1E-04	0		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00
		Open-Ended	1.4E-03	0		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00
Oil/Water	Produced Water [6]	Valves	9.8E-05	39	2.14%	<0.01	<0.01	0.25%	<0.01	<0.01	0.02%	<0.01	<0.01	0.06%	<0.01	<0.01	0.02%	<0.01	<0.01	0.03%	<0.01	<0.01	0.04%	<0.01	<0.01	0.00%	0.00	0.00
		Pump Seals	2.4E-05	2		<0.01	<0.01		<0.01	<0.01		<0.01	<0.01		<0.01	<0.01		<0.01	<0.01		<0.01	<0.01		<0.01	<0.01		0.00	0.00
		Others	1.4E-02	0		<0.01	<0.01		<0.01	<0.01		<0.01	<0.01		<0.01	<0.01		<0.01	<0.01		<0.01	<0.01		<0.01	<0.01		0.00	0.00
		Connectors	1.1E-04	43		<0.01	<0.01		<0.01	<0.01		<0.01	<0.01		<0.01	<0.01		<0.01	<0.01		<0.01	<0.01		<0.01	<0.01		0.00	0.00
		Flanges	2.9E-06	42		<0.01	<0.01		<0.01	<0.01		<0.01	<0.01		<0.01	<0.01		<0.01	<0.01		<0.01	<0.01		<0.01	<0.01		0.00	0.00
		Open-Ended	2.5E-04	0		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00
Heavy Oil	Triethylene Glycol [8]	Valves	8.4E-06	63	100.00%	<0.01	<0.01	0.00%	0.00	0.00	0.00%	0.00	0.00	0.00%	0.00	0.00	0.00%	<0.01	<0.01	0.00%	<0.01	<0.01	0.00%	<0.01	<0.01	0.00%	0.00	0.00
		Others	3.2E-05	4		<0.01	<0.01		0.00	0.00		0.00	0.00		0.00	0.00		<0.01	<0.01		<0.01	<0.01		<0.01	<0.01		0.00	0.00
		Connectors	7.5E-06	434		<0.01	0.03		0.00	0.00		0.00	0.00		0.00	0.00		<0.01	<0.01		<0.01	<0.01		<0.01	<0.01		0.00	0.00
		Flanges	3.9E-07	12		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00
		Open-Ended	1.4E-04	0		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00
Total				**9,827**	-	**6.76**	**29.60**	-	**0.39**	**1.69**	-	**0.03**	**0.12**	-	**0.09**	**0.39**	-	**0.0**	**0.1**	-	**0.0**	**0.19**	-	**0.1**	**0.28**	-	**0.15**	**0.67**

1. Emission factors for total hydrocarbon emissions are from Table 2-4 of the "Protocol for Equipment Leak Emission Estimates". EPA-453/R-95-017.
2. Based on component counts from a similar facility and scaled up based on the number of engines at TAT-Blue Buttes.
3. Hourly Emission Rate (lb/hr) = (Emission Factor, kg/hour/source) * (count) * (1,000 kg/g) / (453.59 g/lb) * (wt %).
4. Annual Emission Rate (tpy) = (Hourly Emission Rate, lb/hr) * (hr/yr) / (2,000 lb/ton).
5. Based on a representative Inlet Gas Analysis Stream from the Blue Buttes facility (sampled 7/12/2016). Sample provided by Targa on 5/2/2018.
6. Weight percent of total hydrocarbons for each constituent based on ProMax Model Condensate Stream (updated 5/1/2018). Produced water stream based on 2% VOC in the produced water liquid stream, as shown in the ProMax model.
7. Light oil methanol stream assumed to be 100% methanol/VOC.
8. Triethylene glycol stream assumed to be 100% VOC.

Targa Badlands LLC - TAT-Blue Buttes Compressor Station
Condensate Tank Emission Calculations

TAT-Blue Buttes Compressor Station Tank Data (EU 11/EPN 14, EU 12/EPN 14)				
Emission Source	Condensate Tank #1 (EU 11)		Condensate Tank #2 (EU 12)	
Source Type	Tank		Tank	
Tank Volume	400	bbl	400	bbl
Annual Throughput [1]	46,578	bbl/yr	46,578	bbl/yr
VOC Working Losses [2]	1.07	lb/hr	1.07	lb/hr
VOC Breathing Losses [2]	1.22	lb/hr	1.22	lb/hr
Average Hourly VOC Flash Losses [2]	1.82	lb/hr	1.82	lb/hr
Average Annual VOC Flash Losses [2]	7.97	tpy	7.97	tpy
Total Hourly VOC Uncontrolled Emissions	4.11	lb/hr	4.11	lb/hr
Total Annual VOC Uncontrolled Emissions	18.01	tpy	18.01	tpy

Pollutant	Weight Percent of VOC Losses				Control Efficiency [3] (%)	Condensate Tank #1 (EU 11) Emissions		Condensate Tank #2 (EU 12) Emissions	
	Working [2]	Breathing [2]	Flash [2] (hourly)	Flash [2] (annual)		(lb/hr)	(tpy)	(lb/hr)	(tpy)
VOC [4]	100.00%	100.00%	100.00%	100.00%	95%	0.21	0.90	0.21	0.90
n-Hexane	3.75%	3.75%	11.75%	11.75%	95%	0.01	0.07	0.01	0.07
Benzene	0.17%	0.17%	0.89%	0.89%	95%	1.01E-03	4.42E-03	1.01E-03	4.42E-03
Toluene	0.15%	0.15%	2.79%	2.79%	95%	2.71E-03	0.01	2.71E-03	0.01
Ethylbenzene	0.01%	0.01%	0.77%	0.77%	95%	7.19E-04	3.15E-03	7.19E-04	3.15E-03
Xylenes	0.02%	0.02%	1.34%	1.34%	95%	1.25E-03	5.47E-03	1.25E-03	5.47E-03
2,2,4-TMP	0.19%	0.19%	1.90%	1.90%	95%	1.94E-03	8.52E-03	1.94E-03	8.52E-03
Total HAP	4.30%	4.30%	19.45%	19.45%	95%	0.02	0.10	0.02	0.10

1. Condensate throughput of 127.6 bbl/day per tank (255.2 bbl/day total) is based on a ratio of actual gas throughput to actual condensate throughput.
2. Working, breathing, and flash losses and weight percent based off of hourly and annual ProMax results, which are based on the ProMax files from the Smokey Compressor Station. Hourly emissions assumed to be annual emissions distributed evenly throughout 8,760 hours of operation.
3. A vapor combustor has been installed to control emissions from the condensate tanks and has a control efficiency to meet the requirements of NSPS OOOOa.
4. VOC weight percentage assumed to be 100% for working and breathing losses.

GHG	Losses Source (lb/hr)				Condensate Tank #1 (EU 11) Emissions		Condensate Tank #2 (EU 12) Emissions	
	Working [1, 2]	Breathing [1, 2]	Flash [1, 2] (hourly)	Flash [1, 2] (annual)	(lb/hr)	(tpy)	(lb/hr)	(tpy)
CO_2	-	-	-	-	-	-	-	-
CH_4	-	-	0.16	0.71	0.16	0.71	0.16	0.71
N_2O	-	-	-	-	-	-	-	-
CO_2e [3]	**-**	**-**	**4.05**	**17.72**	**4.05**	**17.72**	**4.05**	**17.72**

1. Working, breathing, and flash losses and weight percent based off of hourly and annual ProMax results, which are based on the ProMax files from the Smokey Compressor Station. Hourly emissions assumed to be annual emissions distributed evenly throughout 8,760 hours of operation.
2. Condensate throughput of 127.6 bbl/day per tank (255.2 bbl/day total) is based on a ratio of actual gas throughput to actual condensate throughput.
3. Per 40 CFR 98 - Mandatory Greenhouse Gas Reporting, Subpart A, Table A-1. Total CO_2e emissions are calculated based on the following Global Warming Potentials (GWPs).

GHG	GWP
CO_2	1
CH_4	25
N_2O	298

Targa Badlands LLC - TAT-Blue Buttes Compressor Station
Vapor Combustor Emission Calculations

Total Emissions from VCU (EU 14/EPN 14) [1]		
Pollutant	**(lb/hr)**	**(tpy)**
NO_x	0.04	0.05
CO	0.16	0.22
SO_2	2.48E-05	1.09E-04
VOC	0.46	2.01
HAPs	0.05	0.20
Formaldehyde	2.07E-05	3.34E-05

1. Total emissions from the vapor combustor include emissions from the combustion of pilot gas, combustion of gas vented from the condensate tanks and produced water tanks, and VOCs from uncombusted vent gas.

Calculations of Condensate Tank Vent Gas Emissions			
Parameters [1]	**Hourly Value**	**Annual Value**	**Unit**
Vapor MW	41.32	41.32	lb/lb-mol
Net Heating Value	1,946.71	1,946.71	btu/scf
Gross Heating Value	2,116.10	2,116.10	btu/scf
Vapor Volumetric Flow [2]	178.54	178.54	scfh
VOC Destruction Efficiency	95.00		%

Calculations of PW Tank Vent Gas Emissions			
Parameters [1]	**Hourly Value**	**Annual Value**	**Unit**
Vapor MW	41.32	41.32	lb/lb-mol
Net Heating Value	1946.71	1,946.71	btu/scf
Gross Heating Value	2116.10	2,116.10	btu/scf
Vapor Volumetric Flow [2]	47.22	47.22	scfh
VOC Destruction Efficiency	0.00		%

Pollutant	**Emission Factor (lb/MMBtu)**	**Hourly Emissions (lb/hr)**	**Annual Emissions (tpy)**
NOx [3, 4]	0.068	0.03	0.03
CO [3, 4]	0.31	0.15	0.15
VOC [5]	--	0.42	1.82
	(lb/MMscf)	**(lb/hr)**	**(tpy)**
Formaldehyde [6, 7]	0.075	1.69E-05	1.69E-05

HAP Emissions from VCU [8]	**Hourly Emissions (lb/hr)**	**Annual Emissions (tpy)**
n-Hexane	3.02E-02	1.32E-01
Benzene	2.03E-03	8.88E-03
Toluene	5.43E-03	2.38E-02
Ethylbenzene	1.44E-03	6.31E-03
Xylenes	2.50E-03	1.09E-02
2,2,4-TMP	3.90E-03	1.71E-02
Total HAPs [8]	**0.05**	**0.20**

1. Vapor MW, heating values, and vapor volumetric flow are obtained from the ProMax output for condensate tanks and produced water tanks. Vapor volumetric flow for condensate tanks is total flow from both.

2. The volumetric flow for flash losses is calculated by summing the vapor volumetric flow for the vapor stream from the ProMax files and the working and breathing losses, converted to cubic feet per hour. The volumetric flow from ProMax is multiplied by 2 for the condensate tanks to account for flow from each tank.

3. Emission Factors from AP-42 Section 13.5, Tables 13.5-1 and 13.5-2 (12/16).

4. Emissions are calculated as (Emission Factor)*(Gross Heating Value)*(Vapor Volumetric Flow)/(1,000,000 Btu/MMBtu). Annual emission are converted to tons per year.

5. VOC emissions are calculated based on ProMax outputs and are calculated as [(Working and Breathing Losses)+(Flash Losses)]*(1-95% control efficiency) from each of the two condensate tanks.

6. Emission Factor from AP-42 Section 1.4, Table 1.4-3 (7/98).

7. Formaldehyde emissions are calculated as (Emission Factor)*(Vapor Volumetric Flow)*(1 MMscf/1,000,000 scf).

8. HAP hourly and annual emissions are based off of condensate ProMax results and VOC destruction efficiency.

Calculations of Pilot Gas Combustion Emissions		
VCU Information [1]		
VOC DRE [1]	95	%
Pilot Gas Flow [1]	50	SCFH
Heat Content [2]	1,045	Btu/scf

Pollutant	Emission Factor [3]		Emissions (lb/hr)	Emissions (tpy)
NO_X [4]	0.068	lb/MMBtu	3.55E-03	0.02
CO [4]	0.31	lb/MMBtu	0.02	0.07
Formaldehyde [5]	0.075	lb/MMScf	3.75E-06	1.64E-05

1. Information from vendor specification sheet.
2. Heat Content from fuel gas analysis.
3. Emission Factors from AP-42 Section 13.5, Tables 13.5-1 and 13.5-2 (12/16) and AP-42 Section 1.4, Table 1.4-3 (7/98).
4. Emissions calculated as (Emission Factor)(Pilot Gas Heat Content)(Pilot gas Flow)(1 MMBtu/ 1,000,000 Btu). Annual emission include conversion factors to convert to tons per year.
5. Emissions calculated as (Emission Factor)(Pilot gas Flow)(1 MMscf/ 1,000,000 scf). Annual emission include conversion factors to convert to tons per year.

Calculations of Pilot Gas VOC Emissions

$$M=\frac{60(MW)PV}{RT}$$

Where *m=mass flow rate in lb/hr*
MW=molecular weight in lb/lbmole
P=standard pressure=14.7 psia
V=flow rate in scfm
R=gas constant=10.73 psia · ft^3 · $lbmol^{-1}$ · $^oR^{-1}$, and
T=standard temperature=528°R

Constituent [1]	Federal HAP?	Molecular Weight (lb/lb-mole)	Mole % [1] (%)	Volume Flow Rate (scf/hr)	Mass Flow Rate (lb/hr)	Pilot Gas Emissions (lb/hr)	Pilot Gas Emissions (tpy)
Nitrogen	No	28.01	3%	1.50	0.11	5.47E-03	0.02
Methane	No	16.04	63%	31.42	1.31	0.07	0.29
Carbon Dioxide	No	44.01	1%	0.40	0.05	2.26E-03	9.88E-03
Ethane	No	30.07	20%	10.00	0.78	0.04	0.17
Hydrogen Sulfide	No	34.08	0%	-	-	-	-
Propane	No	44.10	9%	4.59	0.53	0.03	0.11
i-Butane	No	58.12	1%	0.43	0.06	3.22E-03	0.01
n-Butane	No	58.12	2%	1.21	0.18	9.12E-03	0.04
neo-Pentane	No	72.15	0%	9.00E-03	1.68E-03	8.42E-05	3.69E-04
i-Pentane	No	72.15	0%	0.16	0.03	1.54E-03	6.72E-03
n-Pentane	No	72.15	0%	0.19	0.04	1.79E-03	7.83E-03
Cyclopentane	No	70.10	0%	7.00E-03	1.27E-03	6.37E-05	2.79E-04
2-Methylpentane	No	86.18	0%	0.02	4.81E-03	2.4E-04	1.05E-03
3-Methylpentane	No	86.18	0%	0.01	2.46E-03	1.23E-04	5.39E-04
n-Hexane	Yes	86.18	0%	0.02	4.58E-03	2.29E-04	1.00E-03
i-Hexanes	No	86.18	0%	1.00E-03	2.24E-04	1.12E-05	4.9E-05
Methylcyclopentane	No	84.16	0%	8.00E-03	1.75E-03	8.73E-05	3.83E-04
Benzene	Yes	78.11	0%	-	-	-	-
Cyclohexane	No	84.16	0%	1.50E-03	3.28E-04	1.64E-05	7.17E-05
n-Heptane	No	100.21	0%	2.50E-03	6.5E-04	3.25E-05	1.42E-04
i-Heptanes	No	100.21	0%	9.50E-03	2.47E-03	1.24E-04	5.41E-04
Methylcyclohexane	No	98.19	0%	2.50E-03	6.37E-04	3.18E-05	1.39E-04
Toluene	Yes	92.14	0%	1.00E-03	2.39E-04	1.2E-05	5.24E-05
n-Octane	No	114.23	0%	1.50E-03	4.45E-04	2.22E-05	9.74E-05
i-Octanes	No	114.23	0%	3.50E-03	1.04E-03	5.19E-05	2.27E-04
Ethylbenzene	Yes	106.17	0%	-	-	-	-
Meta&Para-Xylene	Yes	106.17	0%	1.00E-03	2.75E-04	1.38E-05	6.03E-05
Ortho-Xylene	Yes	106.17	0%	-	-	-	-
n-Nonane	No	128.20	0%	1.00E-03	3.33E-04	1.66E-05	7.28E-05
i-Nonanes	No	128.20	0%	2.00E-03	6.65E-04	3.33E-05	1.46E-04
t-Butylbenzene	No	134.21	0%	5.00E-04	1.74E-04	8.71E-06	3.81E-05
n-Decane	No	142.29	0%	-	-	-	-
i-Decanes	No	142.29	0%	2.00E-03	7.38E-04	3.69E-05	1.62E-04
n-Butylbenzene	No	134.21	0%	-	-	-	-
n-Undecane	No	156.31	0%	-	-	-	-
i-Undecanes	No	156.31	0%	5.00E-04	2.03E-04	1.01E-05	4.44E-05
n-Dodecane	No	170.34	0%	-	-	-	-
i-Dodecanes	No	170.34	0%	-	-	-	-
Total Emissions						0.16	0.68
Total VOC Emissions [2]						0.04	0.19
Total HAP Emissions [2]						3.11E-04	1.36E-03

1. Based on a representative Inlet Gas Analysis Stream the Blue Buttes facility (sampled 7/12/2016). Sample provided by Targa on 5/2/2018.
2. Formaldehyde emissions are included in Total HAP and Total VOC emissions.

Calculations of Pilot Gas SO_2 Emissions

SO_2 is based on a material balance with 100% combustion device efficiency and a maximum 4 ppm fuel Sulfur content.

Gas Stream	Combustion Device Efficiency Fraction	Fuel Burned (lbs/hr)	SO_2 [1] (lb/hr)	SO_2 [1] (TPY)
Fuel Gas	1.00	3.11	2.48E-05	1.09E-04

1. Emissions calculated are equal to (Combustion Device Efficiency Fraction)*(Pilot Fuel Burned)*(Fuel Sulfur Content)*(Mole Wt. of SO_2)/(Mole Wt. of Sulfur). Annual emission are converted to tons per year.

Calculations of GHG Emissions

	Hourly (MMBtu/hr)	Annual Average (MMBtu/hr)
Total Heat Content [1]	0.43	0.43

GHG	Emission Factor [2]	GWPs [3]	Emission Rate [4]	
	lb/MMBtu		lb/hr	tpy
CO_2	142.79	1	61.41	268.97
CH_4	6.61E-03	25	2.84E-03	0.01
N_2O	1.32E-03	298	5.69E-04	0.002
Total CO_2e			16,517	72,346

1. Total heat content is calculated by multiplying the pilot fuel gas heat content by the pilot gas fuel flow and adding the tank vent gas heat content multiplied by the tank vent gas flow.
2. GHG emission factors from 40 CFR 98 Table C-1 for butane and 40 CFR 98 Table C-2 for Petroleum (All fuel types in Table C-1).
3. Global Warming Potentials (GWPs) from 40 CFR 98 Table A-1.

Targa Badlands LLC - TAT-Blue Buttes Compressor Station
Glycol Dehydrator Emission Calculations

TAT-Blue Buttes Compressor Station Dehydrator Data (EU 15/EPN 15)		
Emission Source	TEG Glycol Dehydrator	
Source Type	Dehydrator	
Gas Throughput	36	MMscfd
Inlet Gas Pressure	977	psig
Inlet Gas Temperature	112	°F
Operating Hours per Year	8,760	hr/yr

Pollutant	Emission Factors [1]		Emissions [2]	
			(lb/hr)	(tpy)
VOC	4.55	lb/MMscf	6.83	29.90
n-Hexane	0.08	lb/MMscf	0.11	0.50
Benzene	-	lb/MMscf	-	-
Toluene	0.23	lb/MMscf	0.35	1.54
Ethylbenzene	-	lb/MMscf	-	-
Xylenes	0.46	lb/MMscf	0.68	2.99
2,2,4-TMP	-	lb/MMscf	-	-

1. Emission Factor (lb/MMscf) = (Hourly Emission Rate, lb/hr) / (Gas Throughput, MMscfd) * (24 hrs/day).
2. Hourly and annual emission rates based on GRI-GLYCalc run, run 5/2/18.

GRI GLYCalc Results [1,2]			
	Uncontrolled Regenerator Emissions		
Component	(lbs/hr)	(lbs/day)	(tpy)
Methane	0.4082	10.037	1.8317
Ethane	1.0469	25.125	4.5852
Propane	1.8512	44.429	8.1084
Isobutane	0.3821	9.170	1.6736
n-Butane	1.5367	36.882	6.7309
Isopentane	0.3213	7.712	1.4075
n-Pentane	0.4734	11.361	2.0733
Cyclopentane	0.0758	1.819	0.3320
n-Hexane	0.1141	2.738	0.4998
Cyclohexane	0.0358	0.860	0.1570
Other Hexanes	0.1694	4.065	0.7419
Heptanes	0.2394	5.745	1.0485
Methylcyclohexane	0.0777	1.864	0.3402
Toluene	0.3516	8.439	1.5401
Xylenes	0.6836	16.406	2.9941
C8+ Heavies	0.5137	12.329	2.2500
Total Emissions	8.2909	198.982	36.3143
Total Hydrocarbon Emissions	8.2909	198.982	36.3143
Total VOC Emissions	6.8259	163.821	29.8973
Total HAP Emissions	1.1493	27.583	5.0339

1. Emissions from GRI-GLYCalc results for the dehydrator, run 5/2/2018. Gas stream provided by Targa on 5/2/2018.
2. Flash tank emissions are recycled to the inlet.

GHG Emissions [1]		
Pollutant	(lb/hr)	(tpy)
CO_2	0.21	0.36
CH_4	0.41	2.25
N_2O	-	-
CO_2e [2]	10.42	56.61

1. Emissions from GRI-GLYCalc results for the dehydrator, run 4/3/18. Gas stream provided by Targa on 3/22/18.
2. Per 40 CFR 98 - Mandatory Greenhouse Gas Reporting, Subpart A, Table A-1. Total CO_2e emissions are calculated based on the following Global Warming Potentials (GWPs).

GHG	GWP
CO_2	1
CH_4	25
N_2O	298

Targa Badlands LLC - TAT-Blue Buttes Compressor Station
Glycol Reboiler Criteria Pollutant Emissions Calculations

TAT-Blue Buttes Compressor Station Heater Data (EU 16/EPN 16)		
Emission Source	Glycol Reboiler	
Source Type	Heater	
Heat Input	0.675	MMBtu/hr
Flow Rate	652.05	scf/hr
	5.71	MMscf/yr
Estimated HHV [1]	1,035	Btu/scf
Sulfur Content of Fuel [2]	2.00E-03	gr/scf
Operating Hours per Year	8,760	hr/yr

1. Heating value set equal to the fuel HHV in EU 1.
2. Sulfur content as specified by AP-42 Section 1.4, Table 1.4-2 footnote d (7/98).

Criteria Pollutant	Emission Factors [1]		Converted Emission Factors [2]		Criteria Emissions	
					Hourly [3] (lb/hr)	Annual [4] (tpy)
NO_x	100	lb/MMscf	9.80E-02	lb/MMBtu	0.07	0.29
CO	84	lb/MMscf	8.24E-02	lb/MMBtu	0.06	0.24
VOC	5.5	lb/MMscf	5.39E-03	lb/MMBtu	3.64E-03	0.02
SO_2	0.6	lb/MMscf	5.88E-04	lb/MMBtu	3.97E-04	1.74E-03
PM_{10}	7.6	lb/MMscf	7.45E-03	lb/MMBtu	5.03E-03	0.02
$PM_{2.5}$	7.6	lb/MMscf	7.45E-03	lb/MMBtu	5.03E-03	0.02

1. Emission factors are from AP-42 Tables 1.4-1 & 2 (7/98) for small boilers. SO_2 emissions based on AP-42 Table 1.4-2 (7/98), which is based on 2,000 grains S/MMscf and 100% conversion to SO_2.
2. Per AP-42, Table 1.4-2, footnote a (7/98), emission factors converted from lb/MMscf to lb/MMBtu by dividing by 1,020 Btu/scf.
3. Hourly Emission Rate (lb/hr) = (Emission Factor, lb/MMBtu) * (Heat Input, MMBtu/hr).
4. Annual Emission Rate (tpy) = (Hourly Emission Rate, lb/hr) * (hr/yr) / (2,000 lb/ton).

GHG	Emission Factors [1]		Converted Emission Factors [2]		GHG Emissions	
					Hourly [3]	Annual [4]
					(lb/hr)	(tpy)
CO_2	120,000	lb/MMscf	117.65	lb/MMBtu	79.41	347.82
CH_4	2.3	lb/MMscf	2.25E-03	lb/MMBtu	1.52E-03	6.67E-03
N_2O	2.2	lb/MMscf	2.16E-03	lb/MMBtu	1.46E-03	6.38E-03
CO_2e [5]	**-**	**-**	**118.35**	**lb/MMBtu**	**79.88**	**349.89**

1. Emission factors are from AP-42 Tables 1.4-1 & 2 (7/98) for small boilers. SO_2 emissions based on AP-42 Table 1.4-2 (7/98), which is based on 2,000 grains S/MMscf and 100% conversion to SO_2.

2. Per AP-42, Table 1.4-2, footnote a (7/98), emission factors converted from lb/MMscf to lb/MMBtu by dividing by 1,020 Btu/scf.

3. Hourly Emission Rate (lb/hr) = (Emission Factor, lb/MMBtu) * (Heat Input, MMBtu/hr).

4. Annual Emission Rate (tpy) = (Hourly Emission Rate, lb/hr) * (hr/yr) / (2,000 lb/ton).

5. Per 40 CFR 98 - Mandatory Greenhouse Gas Reporting, Subpart A, Table A-1. Total CO_2e emissions are calculated based on the following Global Warming Potentials (GWPs).

GHG	GWP
CO_2	1
CH_4	25
N_2O	298

HAP	Emission Factors [1]	HAP Emissions [2,3]		
	(lb/MMscf)	(lb/hr)	(lbs/yr)	(tpy)
2-Methylnaphthalene	2.4E-05	1.59E-08	1.39E-04	6.96E-08
3-Methylchloranthrene	1.8E-06	1.19E-09	1.04E-05	5.22E-09
7,12-Dimethylbenz(a)anthracene	1.6E-05	1.06E-08	9.28E-05	4.64E-08
Acenaphthene	1.8E-06	1.19E-09	1.04E-05	5.22E-09
Acenaphthylene	1.8E-06	1.19E-09	1.04E-05	5.22E-09
Anthracene	2.4E-06	1.59E-09	1.39E-05	6.96E-09
Benz(a)anthracene	1.8E-06	1.19E-09	1.04E-05	5.22E-09
Benzene	2.1E-03	1.39E-06	0.01	6.09E-06
Benzo(a)pyrene	1.2E-06	7.94E-10	6.96E-06	3.48E-09
Benzo(b)fluoranthene	1.8E-06	1.19E-09	1.04E-05	5.22E-09
Benzo(g,h,i)perylene	1.2E-06	7.94E-10	6.96E-06	3.48E-09
Benzo(k)fluoranthene	1.8E-06	1.19E-09	1.04E-05	5.22E-09
Chrysene	1.8E-06	1.19E-09	1.04E-05	5.22E-09
Dibenzo(a,h)anthracene	1.2E-06	7.94E-10	6.96E-06	3.48E-09
Dichlorobenzene	1.2E-03	7.94E-07	6.96E-03	3.48E-06
Fluoranthene	3.0E-06	1.99E-09	1.74E-05	8.70E-09
Fluorene	2.8E-06	1.85E-09	1.62E-05	8.12E-09
Formaldehyde	7.5E-02	4.96E-05	0.43	2.17E-04
Hexane	1.8E+00	1.19E-03	10.43	5.22E-03
Indeno(1,2,3-cd)pyrene	1.8E-06	1.19E-09	1.04E-05	5.22E-09
Naphthalene	6.1E-04	4.04E-07	3.54E-03	1.77E-06
Phenanathrene	1.7E-05	1.13E-08	9.86E-05	4.93E-08
Pyrene	5.0E-06	3.31E-09	2.90E-05	1.45E-08
Toluene	3.4E-03	2.25E-06	0.02	9.86E-06
Heater Total HAPs		**1.25E-03**	**10.91**	**5.46E-03**

1. Emission factors from AP-42, Section 1.4, Table 1.4-3 (7/98).
2. Per AP-42, Table 1.4-2, footnote a (7/98), emission factors converted from lb/MMscf to lb/MMBtu by dividing by 1,020 Btu/scf.
3. Annual Emission Rate (tpy) = (Average Hourly Emission Rate, lb/hr) * (8,760 hr/yr) / (2,000 lb/ton).

Targa Badlands LLC - TAT-Blue Buttes Compressor Station
Tank Summary

EU	EPN	Tank Description	Tank Contents	Tank Size	Tank Type	VOC Emissions [1]	
						(lb/hr)	(tpy)
EU 7	EPN 7	Produced Water Tank #1	Produced Water	400 bbl	Vertical Fixed Roof	5.25E-03	0.02
EU 11	EPN 14	Condensate Tank #1	Condensate	400 bbl	Vertical Fixed Roof	0.21	0.90
EU 12	EPN 14	Condensate Tank #2	Condensate	400 bbl	Vertical Fixed Roof	0.21	0.90
EU 17	EPN 17	Methanol Storage Tank	Methanol	2,000 gal	Vertical Fixed Roof	4.63E-03	0.02
EU 18	EPN 18	Lube Oil Tank #1	Lube Oil	500 gal	Horizontal	1.00E-03	1.00E-03
EU 19	EPN 19	Lube Oil Tank #2	Lube Oil	500 gal	Horizontal	1.00E-03	1.00E-03
EU 20	EPN 20	Lube Oil Tank #3	Lube Oil	500 gal	Horizontal	1.00E-03	1.00E-03
EU 21	EPN 21	Lube Oil Tank #4	Lube Oil	500 gal	Horizontal	1.00E-03	1.00E-03
EU 22	EPN 22	Lube Oil Tank #5	Lube Oil	500 gal	Horizontal	1.00E-03	1.00E-03
EU 23	EPN 23	Lube Oil Tank #6	Lube Oil	500 gal	Horizontal	1.00E-03	1.00E-03
EU 24	EPN 24	Antifreeze Tank #1	Antifreeze	500 gal	Horizontal	1.00E-03	1.00E-03
EU 25	EPN 25	Antifreeze Tank #2	Antifreeze	500 gal	Horizontal	1.00E-03	1.00E-03
EU 26	EPN 26	TEG Tank #1	TEG	500 gal	Horizontal	1.00E-03	1.00E-03

1. Emissions from EU 18 - EU 26 are negligible due to the VOC content of each, and have been conservatively assumed to be 0.001 tpy for each tank.

Targa Badlands LLC - TAT-Blue Buttes Compressor Station
Doosan/PSI FPSIB21.9NGP - IC Engine Emissions Calculations

TAT-Blue Buttes Compressor Station Engine Data (EU 27/EPN 27)					
IC Engine Make [1]	Doosan/PSI		Higher Heating Value [6]	1,035.2	Btu/scf
IC Engine Model [1]	FPSIB21.9NGP		Lower Heating Value [6]	935.8	Btu/scf
Power Rating [1,5]	507	bhp	Sulfur Content [2]	2.00E-03	gr/scf
Heat Rate (HHV)	7,716	Btu/bhp-hr	Fuel Consumption [1]	3,779	scf/hr
Duty (input)	3.91	MMBtu/hr	Fuel Consumption	33.10	MMscf/yr
Hours per Year	8,760	hr/yr	Exhaust Gas Flow [1]	2,427	acfm

Criteria Pollutant	Emission Factors		Emissions (lb/hr)	Emissions (tpy)	Source of Emission Factors
NO_x	1.00	g/bhp-hr	1.12	4.90	NSPS JJJJ, Table 1
CO	2.00	g/bhp-hr	2.24	9.79	NSPS JJJJ, Table 1
VOC [3]	0.77	g/bhp-hr	0.86	3.78	NSPS JJJJ, Table 1; AP-42 Tbl 3.2-3 4SRB (7/00)
Formaldehyde	2.05E-02	lb/MMBtu	0.08	0.35	AP-42 Tbl 3.2-3; 4SRB (7/00)
SO_2 [2]	5.88E-04	lb/MMBtu	2.30E-03	0.01	AP-42 Tbl 3.2-3; 4SRB (7/00)
PM_{10} [4]	0.019	lb/MMBtu	0.08	0.33	AP-42 Tbl 3.2-3; 4SRB (7/00)
$PM_{2.5}$ [4]	0.019	lb/MMBtu	0.08	0.33	AP-42 Tbl 3.2-3; 4SRB (7/00)
TSP	0.019	lb/MMBtu	0.08	0.33	AP-42 Tbl 3.2-3; 4SRB (7/00)
Total HAP	-	-	0.13	0.56	AP-42 Tbl 3.2-3; 4SRB (7/00)

GHG	Emission Factors		Emissions (lb/hr)	Emissions (tpy)	Source of Emission Factors [7]
CO_2	110.00	lb/MMBtu	430.32	1,884.81	AP-42 Tbl 3.2-3; 4SRB (7/00)
CH_4	2.3E-01	lb/MMBtu	0.90	3.94	AP-42 Tbl 3.2-3; 4SRB (7/00)
N_2O	1.0E-04	kg/MMBtu	8.62E-04	3.78E-03	40 CFR 98 Subpart C, Table C-2
CO_2e	-	-	453.07	1,984.46	-

Sample Calculations:

(bhp) (Btu/bhp-hr) (MM/10^6) = MMBtu/hr; (MMBtu/hr) / (Btu/scf) (10^6/MM) = scf/hr
(g/bhp-hr) (bhp) (lb/453.59 g) = lb/hr; (lb/MMBtu) (MMBtu/hr) = lb/hr
(lb/hr) (hrs/yr) (ton/2000 lb) = tons/yr

1. Information from manufacturer's specification sheet.
2. SO_2 emissions based on AP-42 Section 3.2, Table 3.2-3 footnote e (7/00), which is based on 100% conversion of sulfur to SO_2 at 2,000 grains/MMscf. Sulfur content of fuel at the TAT-Blue Buttes Compressor Station assumed to be 2,000 grains/MMscf.
3. Per NSPS JJJJ Table 1, footnote d, formaldehyde is not included in the VOC emission factors in Table 1. As such, the formaldehyde emission factor of 2.05E-02 lb/MMBtu from AP-42 is converted to g/bhp-hr and added to the VOC emission factor in order to represent total VOCs.
4. Emission factor for TSP, PM_{10} and $PM_{2.5}$ from AP-42 Section 3.2, Table 3.2-3 (7/00); includes $PM_{10}/PM_{2.5}$ filterable (9.50e-03 lb/MMBtu) and PM condensable (9.91e-3 lb/MMBtu) = 0.01941 lb/MMBtu.
5. Rated at 507 hp at standby.
6. Based off of heat input rating for EU 1.
7. Emission factors for GHG from either AP-42 Section 3.2, Table 3.2-3 (7/00) or 40 CFR 98 Subpart C - General Stationary Fuel Combustion Sources, Table C-2. The CO_{2e} emission factor is calculated using the Global Warming Potential (GWP) of 1 for CO_2, 25 for CH_4, and 298 for N_2O.

HAP	Rich Burn Emission	HAP Emissions	
		(lb/hr)	(tpy)
1,1,2,2-Tetrachloroethane	2.53E-05	9.90E-05	4.34E-04
1,1,2-Trichloroethane	1.53E-05	5.99E-05	2.62E-04
1,3-Butadiene	6.63E-04	2.59E-03	0.01
1,3-Dichloropropene	1.27E-05	4.97E-05	2.18E-04
Acetaldehyde	2.79E-03	0.01	0.05
Acrolein	2.63E-03	0.01	0.05
Benzene	1.58E-03	6.18E-03	0.03
Carbon Tetrachloride	1.77E-05	6.92E-05	3.03E-04
Chlorobenzene	1.29E-05	5.05E-05	2.21E-04
Chloroform	1.37E-05	5.36E-05	2.35E-04
Ethylbenzene	2.48E-05	9.70E-05	4.25E-04
Ethylene Dibromide	2.13E-05	8.33E-05	3.65E-04
Formaldehyde	2.05E-02	0.08	0.35
Methanol	3.06E-03	0.01	0.05
Methylene Chloride	4.12E-05	1.61E-04	7.06E-04
Naphthalene	9.71E-05	3.80E-04	1.66E-03
PAH	1.41E-04	5.52E-04	2.42E-03
Styrene	1.19E-05	4.66E-05	2.04E-04
Toluene	5.58E-04	2.18E-03	9.56E-03
Vinyl Chloride	7.18E-06	2.81E-05	1.23E-04
Xylene	1.95E-04	7.63E-04	3.34E-03
Total HAP Emissions		**0.13**	**0.56**

1. HAP emission factors from AP-42 Section 3.2, Table 3.2-3 (7/00).

Targa Badlands LLC - TAT-Blue Buttes Compressor Station
Doosan/PSI FPSIB21.9NGP - IC Engine Emissions Calculations

TAT-Blue Buttes Compressor Station Engine Data (EU 28/EPN 28)					
IC Engine Make [1]	Doosan/PSI		Higher Heating Value [6]	1,035.2	Btu/scf
IC Engine Model [1]	FPSIB21.9NGP		Lower Heating Value [6]	935.8	Btu/scf
Power Rating [1,5]	507	bhp	Sulfur Content [2]	2.00E-03	gr/scf
Heat Rate (HHV)	7,716	Btu/bhp-hr	Fuel Consumption [1]	3,779	scf/hr
Duty (input)	3.91	MMBtu/hr	Fuel Consumption	33.10	MMscf/yr
Hours per Year	8,760	hr/yr	Exhaust Gas Flow [1]	2,427	acfm

Criteria Pollutant	Emission Factors		Emissions (lb/hr)	Emissions (tpy)	Source of Emission Factors
NO_x	1.00	g/bhp-hr	1.12	4.90	NSPS JJJJ, Table 1
CO	2.00	g/bhp-hr	2.24	9.79	NSPS JJJJ, Table 1
VOC [3]	0.77	g/bhp-hr	0.86	3.78	NSPS JJJJ, Table 1; AP-42 Tbl 3.2-3 4SRB (7/00)
Formaldehyde	2.05E-02	lb/MMBtu	0.08	0.35	AP-42 Tbl 3.2-3; 4SRB (7/00)
SO_2 [2]	5.88E-04	lb/MMBtu	2.30E-03	0.01	AP-42 Tbl 3.2-3; 4SRB (7/00)
PM_{10} [4]	0.019	lb/MMBtu	0.08	0.33	AP-42 Tbl 3.2-3; 4SRB (7/00)
$PM_{2.5}$ [4]	0.019	lb/MMBtu	0.08	0.33	AP-42 Tbl 3.2-3; 4SRB (7/00)
TSP	0.019	lb/MMBtu	0.08	0.33	AP-42 Tbl 3.2-3; 4SRB (7/00)
Total HAP	-	-	0.13	0.56	AP-42 Tbl 3.2-3; 4SRB (7/00)

GHG	Emission Factors		Emissions (lb/hr)	Emissions (tpy)	Source of Emission Factors [7]
CO_2	110.00	lb/MMBtu	430.32	1,884.81	AP-42 Tbl 3.2-3; 4SRB (7/00)
CH_4	2.3E-01	lb/MMBtu	0.90	3.94	AP-42 Tbl 3.2-3; 4SRB (7/00)
N_2O	1.0E-04	kg/MMBtu	8.62E-04	3.78E-03	40 CFR 98 Subpart C, Table C-2
CO_2e	-	-	453.07	1,984.46	-

Sample Calculations:

(bhp) (Btu/bhp-hr) (MM/10^6) = MMBtu/hr; (MMBtu/hr) / (Btu/scf) (10^6/MM) = scf/hr
(g/bhp-hr) (bhp) (lb/453.59 g) = lb/hr; (lb/MMBtu) (MMBtu/hr) = lb/hr
(lb/hr) (hrs/yr) (ton/2000 lb) = tons/yr

1. Information from manufacturer's specification sheet.
2. SO_2 emissions based on AP-42 Section 3.2, Table 3.2-3 footnote e (7/00), which is based on 100% conversion of sulfur to SO_2 at 2,000 grains/MMscf. Sulfur content of fuel at the TAT-Blue Buttes Compressor Station assumed to be 2,000 grains/MMscf.
3. Per NSPS JJJJ Table 1, footnote d, formaldehyde is not included in the VOC emission factors in Table 1. As such, the formaldehyde emission factor of 2.05E-02 lb/MMBtu from AP-42 is converted to g/bhp-hr and added to the VOC emission factor in order to represent total VOCs.
4. Emission factor for TSP, PM_{10} and $PM_{2.5}$ from AP-42 Section 3.2, Table 3.2-3 (7/00); includes $PM_{10}/PM_{2.5}$ filterable (9.50e-03 lb/MMBtu) and PM condensable (9.91e-3 lb/MMBtu) = 0.01941 lb/MMBtu.
5. Rated at 507 hp at standby.
6. Based off of heat input rating for EU 1.
7. Emission factors for GHG from either AP-42 Section 3.2, Table 3.2-3 (7/00) or 40 CFR 98 Subpart C - General Stationary Fuel Combustion Sources, Table C-2. The CO_2e emission factor is calculated using the Global Warming Potential (GWP) of 1 for CO_2, 25 for CH_4, and 298 for N_2O.

HAP	Rich Burn Emission	HAP Emissions	
		(lb/hr)	(tpy)
1,1,2,2-Tetrachloroethane	2.53E-05	9.90E-05	4.34E-04
1,1,2-Trichloroethane	1.53E-05	5.99E-05	2.62E-04
1,3-Butadiene	6.63E-04	2.59E-03	0.01
1,3-Dichloropropene	1.27E-05	4.97E-05	2.18E-04
Acetaldehyde	2.79E-03	0.01	0.05
Acrolein	2.63E-03	0.01	0.05
Benzene	1.58E-03	6.18E-03	0.03
Carbon Tetrachloride	1.77E-05	6.92E-05	3.03E-04
Chlorobenzene	1.29E-05	5.05E-05	2.21E-04
Chloroform	1.37E-05	5.36E-05	2.35E-04
Ethylbenzene	2.48E-05	9.70E-05	4.25E-04
Ethylene Dibromide	2.13E-05	8.33E-05	3.65E-04
Formaldehyde	2.05E-02	0.08	0.35
Methanol	3.06E-03	0.01	0.05
Methylene Chloride	4.12E-05	1.61E-04	7.06E-04
Naphthalene	9.71E-05	3.80E-04	1.66E-03
PAH	1.41E-04	5.52E-04	2.42E-03
Styrene	1.19E-05	4.66E-05	2.04E-04
Toluene	5.58E-04	2.18E-03	9.56E-03
Vinyl Chloride	7.18E-06	2.81E-05	1.23E-04
Xylene	1.95E-04	7.63E-04	3.34E-03
Total HAP Emissions		**0.13**	**0.56**

1. HAP emission factors from AP-42 Section 3.2, Table 3.2-3 (7/00).

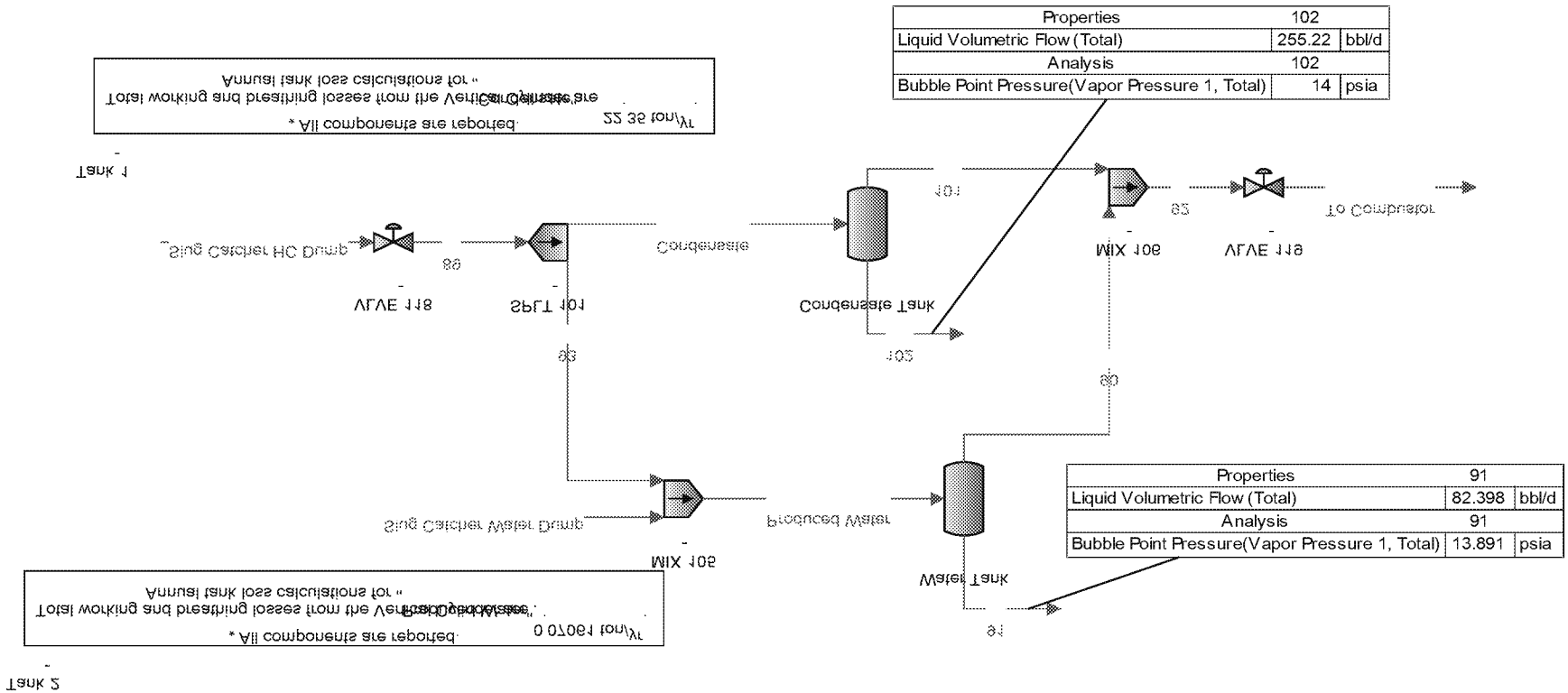
Targa Badlands LLC - TAT-Blue Buttes Compressor Station
Inlet Gas Analysis
"Blue Buttes Compressor Dehy Inlet" - Sampled 7/12/2016 [1]

Component Name	Molecular Weight (lb/lbmol)	Normal Mole Percentage	Weight (lb/lbmol)	Weight Percentage
Nitrogen	28.01	3.01	0.84	3.52
Methane	16.04	62.83	10.08	42.11
Carbon Dioxide	44.01	0.79	0.35	1.45
Ethane	30.07	20.00	6.01	25.12
Hydrogen Sulfide	34.08	-	-	-
Propane	44.10	9.18	4.05	16.91
i-Butane	58.12	0.85	0.50	2.07
n-Butane	58.12	2.42	1.41	5.87
neo-Pentane	72.15	0.02	0.01	0.05
i-Pentane	72.15	0.33	0.24	0.99
n-Pentane	72.15	0.38	0.28	1.15
Cyclopentane	70.1	0.01	9.81E-03	0.04
2-Methylpentane	86.18	0.04	0.04	0.15
3-Methylpentane	86.18	0.02	0.02	0.08
n-Hexane	86.18	0.04	0.04	0.15
i-Hexanes	86.18	2.00E-03	1.72E-03	7.20E-03
Methylcyclopentane	84.162	0.02	0.01	0.06
Benzene	78.11	-	-	-
Cyclohexane	84.162	3.00E-03	2.52E-03	0.01
n-Heptane	100.21	5.00E-03	5.01E-03	0.02
i-Heptanes	100.21	0.02	0.02	0.08
Methylcyclohexane	98.186	5.00E-03	4.91E-03	0.02
Toluene	92.14	2.00E-03	1.84E-03	7.70E-03
n-Octane	114.23	3.00E-03	3.43E-03	0.01
i-Octanes	114.23	7.00E-03	8.00E-03	0.03
Ethylbenzene	106.17	-	-	-
Meta&Para-Xylene	106.17	2.00E-03	2.12E-03	8.87E-03
Ortho-Xylene	106.17	-	-	-
n-Nonane	128.2	2.00E-03	2.56E-03	0.01
i-Nonanes	128.2	4.00E-03	5.13E-03	0.02
t-Butylbenzene	134.212	1.00E-03	1.34E-03	5.61E-03
n-Decane	142.29	-	-	-
i-Decanes	142.29	4.00E-03	5.69E-03	0.02
n-Butylbenzene	134.212	-	-	-
n-Undecane	156.31	-	-	-
i-Undecanes	156.31	1.00E-03	1.56E-03	6.53E-03
n-Dodecane	170.34	-	-	-
i-Dodecanes	170.34	-	-	-
Water	18.02	-	-	-
Total	-	100.00	23.94	100.00
Total VOC	-	13.37	6.65	27.80

1. Using a representative Inlet Gas Analysis Stream from the Blue Buttes facility (sampled 7/12/2016). Provided by Targa on 5/2/2018.

Gas Molecular Weight = 23.94

Targa Badlands LLC - TAT-Blue Buttes Compressor Station
Condensate, Produced Water Annual Flowsheet



Targa Badlands LLC - TAT-Blue Buttes Compressor Station
Condensate, Produced Water Annual Pstreams

Process Streams		Condensate	Produced Wate	Catcher HC D	Catcher Water	To Combustor	89	90	91	92	93	101	102
Composition	Status:												
Phase: Total	From Block:	SPLT-101	MIX-103	--	--	VLVE-110	VLVE-110	Water Tank	Water Tank	MIX-105	SPLT-101	Condensate Tank	Condensate Tank
	To Block:	Condensate Tank	Water Tank	VLVE-110	MIX-103	--	SPLT-101	MIX-105	--	VLVE-110	MIX-101	MIX-105	--
Mass Fraction		%	%	%	%	%	%	%	%	%	%	%	%
Carbon Dioxide		0	0	0*	0*	0	0		0	0	0	0	0
Nitrogen		0.028	0.000602956	0.028*	0*	10.1788	0.028		0.000602956	10.1788	0.028	10.1788	0.00733118
Methane		0.022	0.000473751	0.022*	0*	4.56252	0.022		0.000473751	4.56252	0.022	4.56252	0.0127547
Ethane		0.353	0.00760156	0.353*	0*	14.8336	0.353		0.00760156	14.8336	0.353	14.8336	0.323515
Propane		2.407	0.0518327	2.407*	0*	27.2783	2.407		0.0518327	27.2783	2.407	27.2783	2.35636
i-Butane		1.462	0.0314829	1.462*	0*	5.77522	1.462		0.0314829	5.77522	1.462	5.77522	1.45322
n-Butane		7.039	0.151579	7.039*	0*	17.7421	7.039		0.151579	17.7421	7.039	17.7421	7.01721
i-Pentane		5.858	0.126147	5.858*	0*	5.52719	5.858		0.126147	5.52719	5.858	5.52719	5.85867
n-Pentane		11.755	0.253134	11.755*	0*	7.85473	11.755		0.253134	7.85473	11.755	7.85473	11.7629
n-Hexane		11.693	0.251799	11.693*	0*	1.91528	11.693		0.251799	1.91528	11.693	1.91528	11.7129
Heptane		23.6	0.508206	23.6*	0*	1.03266	23.6		0.508206	1.03266	23.6	1.03266	23.6460
Octane		12.908	0.277963	12.908*	0*	0.152450	12.908		0.277963	0.152450	12.908	0.152450	12.9340
Nonane		2.831	0.0609632	2.831*	0*	0.00876260	2.831		0.0609632	0.00876260	2.831	0.00876260	2.83675
Decane		0.873	0.0187993	0.873*	0*	0.000800063	0.873		0.0187993	0.000800063	0.873	0.000800063	0.874776
Water		0	97.8466	0*	100*	0	0		97.8466	0	0	0	0
TEG		0	0	0*	0*	0	0		0	0	0	0	0
EG		0	0	0*	0*	0	0		0	0	0	0	0
2-Methylpentane		8.233	0.177291	8.233*	0*	2.03120	8.233		0.177291	2.03120	8.233	2.03120	8.24563
3-Methylpentane		3.282	0.0706751	3.282*	0*	0.723629	3.282		0.0706751	0.723629	3.282	0.723629	3.28721
2,2,4-Trimethylpentane		1.889	0.0406780	1.889*	0*	0.0925538	1.889		0.0406780	0.0925538	1.889	0.0925538	1.89266
Benzene		0.887	0.0191008	0.887*	0*	0.146704	0.887		0.0191008	0.146704	0.887	0.146704	0.888507
Toluene		2.774	0.0597357	2.774*	0*	0.118597	2.774		0.0597357	0.118597	2.774	0.118597	2.77941
Ethylbenzene		0.769	0.0165598	0.769*	0*	0.00938942	0.769		0.0165598	0.00938942	0.769	0.00938942	0.770547
m-Xylene		0.154	0.00331626	0.154*	0*	0.00174483	0.154		0.00331626	0.00174483	0.154	0.00174483	0.154310
p-Xylene		0.956	0.0205866	0.956*	0*	0.0114939	0.956		0.0205866	0.0114939	0.956	0.0114939	0.957923
o-Xylene		0.227	0.00488825	0.227*	0*	0.00217790	0.227		0.00488825	0.00217790	0.227	0.00217790	0.227458
Mass Flow		lb/h	lb/h	lb/h	lb/h	lb/h	lb/h	lb/h	lb/h	lb/h	lb/h	lb/h	lb/h
Carbon Dioxide		0	0	0*	0*	0	0	0	0	0	0	0	0
Nitrogen		0.712071	0.00719264	0.719264*	0*	0.526010	0.719264	0	0.00719264	0.526010	0.00719264	0.526010	0.186061
Methane		0.559485	0.00565136	0.565136*	0*	0.235776	0.565136	0	0.00565136	0.235776	0.00565136	0.235776	0.323708
Ethane		8.97719	0.0906787	9.06787*	0*	0.766554	9.06787	0	0.0906787	0.766554	0.0906787	0.766554	8.21063
Propane		61.2127	0.618310	61.8310*	0*	1.40966	61.8310	0	0.618310	1.40966	0.618310	1.40966	59.8031
i-Butane		37.1803	0.375559	37.5559*	0*	0.298445	37.5559	0	0.375559	0.298445	0.375559	0.298445	36.8819
n-Butane		179.010	1.80818	180.818*	0*	0.916854	180.818	0	1.80818	0.916854	1.80818	0.916854	178.093
i-Pentane		148.976	1.50480	150.480*	0*	0.285627	150.480	0	1.50480	0.285627	1.50480	0.285627	148.690
n-Pentane		298.943	3.01962	301.962*	0*	0.405907	301.962	0	3.01962	0.405907	3.01962	0.405907	298.537
n-Hexane		297.366	3.00370	300.370*	0*	0.0989755	300.370	0	3.00370	0.0989755	3.00370	0.0989755	297.267
Heptane		600.175	6.06237	606.237*	0*	0.0533645	606.237	0	6.06237	0.0533645	6.06237	0.0533645	600.121
Octane		328.265	3.31581	331.581*	0*	0.00787811	331.581	0	3.31581	0.00787811	3.31581	0.00787811	328.257
Nonane		71.9955	0.727227	72.7227*	0*	0.000452823	72.7227	0	0.727227	0.000452823	0.727227	0.000452823	71.9951
Decane		22.2014	0.224256	22.4256*	0*	4.13447E-05	22.4256	0	0.224256	4.13447E-05	0.224256	4.13447E-05	22.2013
Water		0	1167.21	0*	1167.21*	0	0	0	1167.21	0	0	0	0
TEG		0	0	0*	0*	0	0	0	0	0	0	0	0
EG		0	0	0*	0*	0	0	0	0	0	0	0	0
2-Methylpentane		209.374	2.11489	211.489*	0*	0.104966	211.489	0	2.11489	0.104966	2.11489	0.104966	209.269
3-Methylpentane		83.4649	0.843080	84.3080*	0*	0.0373948	84.3080	0	0.843080	0.0373948	0.843080	0.0373948	83.4276
2,2,4-Trimethylpentane		48.0394	0.485246	48.5246*	0*	0.00478288	48.5246	0	0.485246	0.00478288	0.485246	0.00478288	48.0346
Benzene		22.5574	0.227853	22.7853*	0*	0.00758117	22.7853	0	0.227853	0.00758117	0.227853	0.00758117	22.5498
Toluene		70.5459	0.712585	71.2585*	0*	0.00612871	71.2585	0	0.712585	0.00612871	0.712585	0.00612871	70.5398
Ethylbenzene		19.5565	0.197541	19.7541*	0*	0.000485215	19.7541	0	0.197541	0.000485215	0.197541	0.000485215	19.5560
m-Xylene		3.91639	0.0395595	3.95595*	0*	9.01674E-05	3.95595	0	0.0395595	9.01674E-05	0.0395595	9.01674E-05	3.91630
p-Xylene		24.3122	0.245577	24.5577*	0*	0.000593969	24.5577	0	0.245577	0.000593969	0.245577	0.000593969	24.3116
o-Xylene		5.77287	0.0583118	5.83118*	0*	0.000112547	5.83118	0	0.0583118	0.000112547	0.0583118	0.000112547	5.77275

Process Streams		Condensate	Treated Wate	Caustic	HC Dr	Water To Combustor	89	90	91	92	93	101	102
Properties	Units												
Name													
Property													
Temperature	°F	39.5457	40.0055	40*	40*	39.4542	39.5457		40.0055	39.5457	39.5457	39.5457	39.5457
Pressure	psia	14	14	38.5*	15*	13.5	14*	14	14	14	14	14	14
Mole Fraction Vapor	%	0.415679	0	0	0	100	0.415679	100	0	100	0.415679	100	0
Mole Fraction Light Liquid	%	99.5843	0.462752	100	100	0	99.5843		0.462752	0	99.5843	0	100
Mole Fraction Heavy Liquid	%	0	99.5372	0	0	0	0		99.5372	0	0	0	0
Molecular Weight	lb/lbmol	84.5337	18.3258	84.5337	18.0153	41.3239	84.5337		18.3258	41.3239	84.5337	41.3239	84.7140
Mass Density	lb/ft^3	23.7951	61.8843	42.4861	62.5108	0.105611	23.7951		61.8843	0.109559	23.7951	0.109559	42.5065
Molar Flow	lbmol/h	30.0840	65.0938	30.3879	64.7899	0.125053	30.3879	0	65.0938	0.125053	0.303879	0.125053	29.9590
Mass Flow	lb/h	2543.11	1192.90	2568.80	1167.21	5.16768	2568.80	0	1192.90	5.16768	25.6880	5.16768	2537.94
Vapor Volumetric Flow	ft^3/h	106.875	19.2762	60.4621	18.6721	48.9314	107.955		19.2762	47.1681	1.07955	47.1681	59.7072
Liquid Volumetric Flow	gpm	13.3247	2.40327	7.53813	2.32795	6.10054	13.4593		2.40327	5.88070	0.134593	5.88070	7.44402
Std Vapor Volumetric Flow	MMSCFD	0.273994	0.592849	0.276761	0.590081	0.00113893	0.276761	0	0.592849	0.00113893	0.00276761	0.00113893	0.272855
Std Liquid Volumetric Flow	sgpm	7.65188	2.41063	7.72917*	2.33333*	0.0200847	7.72917	0	2.41063	0.0200847	0.0772917	0.0200847	7.63179
Compressibility		0.00928364	0.000773142	0.0142855	0.000806177	0.986178	0.00928364		0.000773142	0.985668	0.00928364	0.985668	0.00520807
Specific Gravity			0.992228	0.681206	1.00227	1.42680			0.992228	1.42680		1.42680	0.681532
API Gravity			11.4710	79.4214	9.99885				11.4710				79.3907
Enthalpy	Btu/h	-2.44731E+06	-8.02900E+06	-2.47203E+06	-8.00428E+06	-4931.84	-2.47203E+06	0	-8.02900E+06	-4931.84	-24720.3	-4931.84	-2.44238E+06
Mass Enthalpy	Btu/lb	-962.329	-6730.68	-962.329	-6857.63	-954.363	-962.329		-6730.68	-954.363	-962.329	-954.363	-962.346
Mass Cp	Btu/(lb*°F)	0.502370	0.975353	0.502948	0.985682	0.375897	0.502370		0.975353	0.376047	0.502370	0.376047	0.502628
Ideal Gas CpCv Ratio		1.06854	1.32162	1.06849	1.32729	1.14782	1.06854		1.32162	1.14780	1.06854	1.14780	1.06839
Dynamic Viscosity	cP		1.47014	0.365922	1.50626	0.00868944			1.47014	0.00869223		0.00869223	0.367507
Kinematic Viscosity	cSt		1.48305	0.537676	1.50426	5.13645			1.48305	4.95294		4.95294	0.539746
Thermal Conductivity	Btu/(h*ft*°F)		0.323843?	0.0715302?	0.332053	0.0104156			0.323843?	0.0104206		0.0104206	0.0716152?
Surface Tension	lbf/ft		0.00513791?	0.00134353	0.00525958				0.00513791?				0.00137635?
Net Ideal Gas Heating Value	Btu/ft^3	4296.88	20.0592	4296.88	0	1946.71	4296.88		20.0592	1946.71	4296.88	1946.71	4306.69
Net Liquid Heating Value	Btu/lb	19130.0	-624.990	19130.0	-1059.76	17741.9	19130.0		-624.990	17741.9	19130.0	17741.9	19132.8
Gross Ideal Gas Heating Value	Btu/ft^3	4634.08	71.7086	4634.08	50.3101	2116.10	4634.08		71.7086	2116.10	4634.08	2116.10	4644.59
Gross Liquid Heating Value	Btu/lb	20643.8	444.546	20643.8	0	19297.5	20643.8		444.546	19297.5	20643.8	19297.5	20646.5

Targa Badlands LLC - TAT-Blue Buttes Compressor Station
Condensate Tank Working and Breathing Emission Calculations

Component	Molecular Weight	Working Losses (tpy)	Weight %	Breathing Losses (tpy)	Weight %	Total Losses (tpy)	Weight %
Propane	44.1	2.80	29.83%	3.19	29.82%	5.99	29.83%
Isobutane	58.12	0.76	8.09%	0.86	8.09%	1.63	8.09%
n-Butane	58.12	2.63	27.94%	2.99	27.94%	5.61	27.94%
Isopentane	72.15	0.84	8.95%	0.96	8.95%	1.80	8.95%
n-Pentane	72.15	1.25	13.31%	1.42	13.31%	2.67	13.31%
n-Hexane	86.18	0.35	3.75%	0.40	3.75%	0.75	3.75%
Heptane	100.21	0.20	2.13%	0.23	2.14%	0.43	2.13%
Octane	114.23	0.03	0.34%	0.04	0.34%	0.07	0.34%
Nonane	128.2	2.00E-03	0.02%	2.28E-03	0.02%	4.28E-03	0.02%
Decane	142.29	1.80E-04	0.00%	2.04E-04	0.00%	3.84E-04	0.00%
2-Methylpentane	86.18	0.35	3.74%	0.40	3.74%	0.75	3.74%
3-Methylpentane	86.18	0.13	1.34%	0.14	1.34%	0.27	1.34%
Pentane, 2,2,4-Trimethyl-	114.23	0.02	0.19%	0.02	0.19%	0.04	0.19%
Benzene	78.11	0.02	0.17%	0.02	0.17%	0.03	0.17%
Toluene	92.14	0.01	0.15%	0.02	0.15%	0.03	0.15%
Ethylbenzene	106.17	1.31E-03	0.01%	1.49E-03	0.01%	2.80E-03	0.01%
m-Xylene	106.17	3.13E-04	0.00%	3.56E-04	0.00%	6.68E-04	0.00%
p-Xylene	106.17	1.46E-03	0.02%	1.66E-03	0.02%	3.11E-03	0.02%
o-Xylene	106.17	2.53E-04	0.00%	2.87E-04	0.00%	5.40E-04	0.00%
VOC Total	-	9.40	100.00%	10.68	100.00%	20.08	100.00%
HAP Total	-	0.40	4.30%	0.46	4.30%	0.86	4.30%

Targa Badlands LLC - TAT-Blue Buttes Compressor Station
Produced Water Tank Working and Breathing Emission Calculations

Component	Molecular Weight	Working Losses (tpy)	Weight %	Breathing Losses (tpy)	Weight %	Total Losses (tpy)	Weight %
Propane	44.1	5.32E-03	29.97%	1.57E-03	29.96%	6.89E-03	29.97%
Isobutane	58.12	1.43E-03	8.06%	4.21E-04	8.06%	1.85E-03	8.06%
n-Butane	58.12	4.95E-03	27.87%	1.46E-03	27.88%	6.41E-03	27.87%
Isopentane	72.15	1.59E-03	8.94%	4.67E-04	8.94%	2.06E-03	8.94%
n-Pentane	72.15	2.36E-03	13.29%	6.95E-04	13.29%	3.06E-03	13.29%
n-Hexane	86.18	6.66E-04	3.75%	1.96E-04	3.75%	8.62E-04	3.75%
Heptane	100.21	3.79E-04	2.13%	1.12E-04	2.14%	4.91E-04	2.13%
Octane	114.23	5.98E-05	0.34%	1.76E-05	0.34%	7.74E-05	0.34%
Nonane	128.2	3.78E-06	0.02%	1.11E-06	0.02%	4.90E-06	0.02%
Decane	142.29	3.40E-07	0.00%	9.99E-08	0.00%	4.39E-07	0.00%
2-Methylpentane	86.18	6.65E-04	3.74%	1.96E-04	3.74%	8.60E-04	3.74%
3-Methylpentane	86.18	2.37E-04	1.34%	6.99E-05	1.34%	3.07E-04	1.34%
Pentane, 2,2,4-Trimethyl-	114.23	3.36E-05	0.19%	9.88E-06	0.19%	4.34E-05	0.19%
Benzene	78.11	3.08E-05	0.17%	9.06E-06	0.17%	3.98E-05	0.17%
Toluene	92.14	2.72E-05	0.15%	8.02E-06	0.15%	3.53E-05	0.15%
Ethylbenzene	106.17	2.47E-06	0.01%	7.28E-07	0.01%	3.20E-06	0.01%
m-Xylene	106.17	5.91E-07	0.00%	1.74E-07	0.00%	7.65E-07	0.00%
p-Xylene	106.17	2.75E-06	0.02%	8.10E-07	0.02%	3.56E-06	0.02%
o-Xylene	106.17	4.77E-07	0.00%	1.40E-07	0.00%	6.18E-07	0.00%
VOC Total	-	0.02	100.00%	5.23E-03	100.00%	0.02	100.00%
HAP Total	-	7.63E-04	4.30%	2.25E-04	4.30%	9.88E-04	4.30%

TANKS 4.0.9d
Emissions Report - Detail Format
Tank Indentification and Physical Characteristics

Identification

User Identification:	EU/EPN 17
City:	Williston
State:	North Dakota
Company:	
Type of Tank:	Vertical Fixed Roof Tank
Description:	2,000 Gallon Methanol Tank

Tank Dimensions

Shell Height (ft):	11.83
Diameter (ft):	5.33
Liquid Height (ft) :	11.83
Avg. Liquid Height (ft):	5.92
Volume (gallons):	2,000.00
Turnovers:	19.00
Net Throughput(gal/yr):	38,000.00
Is Tank Heated (y/n):	N

Paint Characteristics

Shell Color/Shade:	White/White
Shell Condition	Good
Roof Color/Shade:	White/White
Roof Condition:	Good

Roof Characteristics

Type:	Cone
Height (ft)	1.00
Slope (ft/ft) (Cone Roof)	0.38

Breather Vent Settings

Vacuum Settings (psig):	-0.03
Pressure Settings (psig)	0.03

Meterological Data used in Emissions Calculations: Williston, North Dakota (Avg Atmospheric Pressure = 13.82 psia)

TANKS 4.0.9d
Emissions Report - Detail Format
Liquid Contents of Storage Tank

EU/EPN 17 - Vertical Fixed Roof Tank
Williston, North Dakota

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F) Avg.	Min.	Max.	Liquid Bulk Temp (deg F)	Vapor Pressure (psia) Avg.	Min.	Max.	Vapor Mol. Weight.	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
Methyl alcohol	Jan	27.65	23.33	31.96	41.45	0.4802	0.4092	0.5616	32.0400			32.04	Option 2: A=7.897, B=1474.08, C=229.13
Methyl alcohol	Feb	31.17	26.51	35.84	41.45	0.5459	0.4604	0.6448	32.0400			32.04	Option 2: A=7.897, B=1474.08, C=229.13
Methyl alcohol	Mar	37.19	31.92	42.46	41.45	0.6760	0.5607	0.8113	32.0400			32.04	Option 2: A=7.897, B=1474.08, C=229.13
Methyl alcohol	Apr	44.20	37.87	50.52	41.45	0.8606	0.6923	1.0629	32.0400			32.04	Option 2: A=7.897, B=1474.08, C=229.13
Methyl alcohol	May	49.98	43.10	56.85	41.45	1.0440	0.8292	1.3049	32.0400			32.04	Option 2: A=7.897, B=1474.08, C=229.13
Methyl alcohol	Jun	54.43	47.20	61.65	41.45	1.2073	0.9522	1.5189	32.0400			32.04	Option 2: A=7.897, B=1474.08, C=229.13
Methyl alcohol	Jul	57.24	49.54	64.95	41.45	1.3214	1.0290	1.6823	32.0400			32.04	Option 2: A=7.897, B=1474.08, C=229.13
Methyl alcohol	Aug	55.94	48.47	63.41	41.45	1.2675	0.9932	1.6044	32.0400			32.04	Option 2: A=7.897, B=1474.08, C=229.13
Methyl alcohol	Sep	49.76	43.18	56.34	41.45	1.0366	0.8314	1.2839	32.0400			32.04	Option 2: A=7.897, B=1474.08, C=229.13
Methyl alcohol	Oct	44.08	38.23	49.93	41.45	0.8572	0.7010	1.0424	32.0400			32.04	Option 2: A=7.897, B=1474.08, C=229.13
Methyl alcohol	Nov	35.80	31.32	40.28	41.45	0.6438	0.5489	0.7526	32.0400			32.04	Option 2: A=7.897, B=1474.08, C=229.13
Methyl alcohol	Dec	29.47	25.33	33.61	41.45	0.5132	0.4408	0.5957	32.0400			32.04	Option 2: A=7.897, B=1474.08, C=229.13

TANKS 4.0.9d
Emissions Report - Detail Format
Detail Calculations (AP-42)

EU/EPN 17 - Vertical Fixed Roof Tank
Williston, North Dakota

Month:	January	February	March	April	May	June	July	August	September	October	November	December
Standing Losses (lb):	0.4641	0.5201	0.8166	1.2304	1.6975	2.0180	2.4559	2.2751	1.5575	1.1649	0.6288	0.4741
Vapor Space Volume (cu ft):	139.3031	139.3031	139.3031	139.3031	139.3031	139.3031	139.3031	139.3031	139.3031	139.3031	139.3031	139.3031
Vapor Density (lb/cu ft):	0.0029	0.0033	0.0041	0.0051	0.0061	0.0070	0.0076	0.0073	0.0061	0.0051	0.0039	0.0031
Vapor Space Expansion Factor:	0.0423	0.0474	0.0570	0.0742	0.0865	0.0964	0.1071	0.1019	0.0824	0.0682	0.0470	0.0410
Vented Vapor Saturation Factor:	0.8629	0.8470	0.8172	0.7784	0.7432	0.7145	0.6958	0.7045	0.7446	0.7790	0.8244	0.8548
Tank Vapor Space Volume:												
Vapor Space Volume (cu ft):	139.3031	139.3031	139.3031	139.3031	139.3031	139.3031	139.3031	139.3031	139.3031	139.3031	139.3031	139.3031
Tank Diameter (ft):	5.3300	5.3300	5.3300	5.3300	5.3300	5.3300	5.3300	5.3300	5.3300	5.3300	5.3300	5.3300
Vapor Space Outage (ft):	6.2433	6.2433	6.2433	6.2433	6.2433	6.2433	6.2433	6.2433	6.2433	6.2433	6.2433	6.2433
Tank Shell Height (ft):	11.8300	11.8300	11.8300	11.8300	11.8300	11.8300	11.8300	11.8300	11.8300	11.8300	11.8300	11.8300
Average Liquid Height (ft):	5.9200	5.9200	5.9200	5.9200	5.9200	5.9200	5.9200	5.9200	5.9200	5.9200	5.9200	5.9200
Roof Outage (ft):	0.3333	0.3333	0.3333	0.3333	0.3333	0.3333	0.3333	0.3333	0.3333	0.3333	0.3333	0.3333
Roof Outage (Cone Roof)												
Roof Outage (ft):	0.3333	0.3333	0.3333	0.3333	0.3333	0.3333	0.3333	0.3333	0.3333	0.3333	0.3333	0.3333
Roof Height (ft):	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Roof Slope (ft/ft):	0.3800	0.3800	0.3800	0.3800	0.3800	0.3800	0.3800	0.3800	0.3800	0.3800	0.3800	0.3800
Shell Radius (ft):	2.6650	2.6650	2.6650	2.6650	2.6650	2.6650	2.6650	2.6650	2.6650	2.6650	2.6650	2.6650
Vapor Density												
Vapor Density (lb/cu ft):	0.0029	0.0033	0.0041	0.0051	0.0061	0.0070	0.0076	0.0073	0.0061	0.0051	0.0039	0.0031
Vapor Molecular Weight (lb/lb-mole):	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.4802	0.5459	0.6760	0.8606	1.0440	1.2073	1.3214	1.2675	1.0366	0.8572	0.6438	0.5132
Daily Avg. Liquid Surface Temp. (deg. R):	487.3186	490.8447	496.8602	503.8659	509.6452	514.0987	516.9127	515.6102	509.4312	503.7493	495.4708	489.1381
Daily Average Ambient Temp. (deg. F):	8.9000	16.0500	28.4000	43.1500	55.2500	64.7000	70.6500	68.7000	56.2500	44.7500	27.1500	13.2000
Ideal Gas Constant R (psia cuft / (lb-mol-deg R)):	10.731	10.731	10.731	10.731	10.731	10.731	10.731	10.731	10.731	10.731	10.731	10.731
Liquid Bulk Temperature (deg. R):	501.1192	501.1192	501.1192	501.1192	501.1192	501.1192	501.1192	501.1192	501.1192	501.1192	501.1192	501.1192
Tank Paint Solar Absorptance (Shell):	0.1700	0.1700	0.1700	0.1700	0.1700	0.1700	0.1700	0.1700	0.1700	0.1700	0.1700	0.1700
Tank Paint Solar Absorptance (Roof):	0.1700	0.1700	0.1700	0.1700	0.1700	0.1700	0.1700	0.1700	0.1700	0.1700	0.1700	0.1700
Daily Total Solar Insulation Factor (Btu/sqft day):	388.0000	671.0000	1,104.0000	1,488.0000	1,827.0000	2,047.0000	2,193.0000	1,862.0000	1,340.0000	877.0000	479.0000	334.0000
Vapor Space Expansion Factor												
Vapor Space Expansion Factor:	0.0423	0.0474	0.0570	0.0742	0.0865	0.0964	0.1071	0.1019	0.0824	0.0682	0.0470	0.0410
Daily Vapor Temperature Range (deg. R):	17.2549	18.6740	21.0950	25.2989	27.4885	28.8957	30.8147	29.8871	26.3224	23.3985	17.9040	16.5658
Daily Vapor Pressure Range (psia):	0.1524	0.1843	0.2507	0.3706	0.4757	0.5666	0.6533	0.6112	0.4525	0.3413	0.2038	0.1549
Breather Vent Press. Setting Range(psia):	0.0600	0.0600	0.0600	0.0600	0.0600	0.0600	0.0600	0.0600	0.0600	0.0600	0.0600	0.0600
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.4802	0.5459	0.6760	0.8606	1.0440	1.2073	1.3214	1.2675	1.0366	0.8572	0.6438	0.5132
Vapor Pressure at Daily Minimum Liquid Surface Temperature (psia):	0.4092	0.4604	0.5607	0.6923	0.8292	0.9522	1.0290	0.9932	0.8314	0.7010	0.5489	0.4408
Vapor Pressure at Daily Maximum Liquid Surface Temperature (psia):	0.5616	0.6448	0.8113	1.0629	1.3049	1.5189	1.6823	1.6044	1.2839	1.0424	0.7526	0.5957
Daily Avg. Liquid Surface Temp. (deg R):	487.3186	490.8447	496.8602	503.8659	509.6452	514.0987	516.9127	515.6102	509.4312	503.7493	495.4708	489.1381
Daily Min. Liquid Surface Temp. (deg R):	483.0049	486.1762	491.5864	497.5412	502.7731	506.8747	509.2091	508.1384	502.8506	497.8997	490.9948	484.9966
Daily Max. Liquid Surface Temp. (deg R):	491.6323	495.5132	502.1340	510.1906	516.5173	521.3226	524.6164	523.0820	516.0118	509.5990	499.9468	493.2796
Daily Ambient Temp. Range (deg. R):	21.4000	21.5000	22.0000	25.3000	26.1000	26.6000	28.3000	29.2000	27.7000	26.7000	21.7000	20.8000
Vented Vapor Saturation Factor												
Vented Vapor Saturation Factor:	0.8629	0.8470	0.8172	0.7784	0.7432	0.7145	0.6958	0.7045	0.7446	0.7790	0.8244	0.8548
Vapor Pressure at Daily Average Liquid: Surface Temperature (psia):	0.4802	0.5459	0.6760	0.8606	1.0440	1.2073	1.3214	1.2675	1.0366	0.8572	0.6438	0.5132
Vapor Space Outage (ft):	6.2433	6.2433	6.2433	6.2433	6.2433	6.2433	6.2433	6.2433	6.2433	6.2433	6.2433	6.2433
Working Losses (lb):	1.1600	1.3187	1.6331	2.0789	2.5219	2.9165	3.1922	3.0620	2.5042	2.0707	1.5552	1.2397
Vapor Molecular Weight (lb/lb-mole):	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.4802	0.5459	0.6760	0.8606	1.0440	1.2073	1.3214	1.2675	1.0366	0.8572	0.6438	0.5132
Net Throughput (gal/mo.):	3,166.6667	3,166.6667	3,166.6667	3,166.6667	3,166.6667	3,166.6667	3,166.6667	3,166.6667	3,166.6667	3,166.6667	3,166.6667	3,166.6667
Annual Turnovers:	19.0000	19.0000	19.0000	19.0000	19.0000	19.0000	19.0000	19.0000	19.0000	19.0000	19.0000	19.0000
Turnover Factor:	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Maximum Liquid Volume (gal):	2,000.0000	2,000.0000	2,000.0000	2,000.0000	2,000.0000	2,000.0000	2,000.0000	2,000.0000	2,000.0000	2,000.0000	2,000.0000	2,000.0000
Maximum Liquid Height (ft):	11.8300	11.8300	11.8300	11.8300	11.8300	11.8300	11.8300	11.8300	11.8300	11.8300	11.8300	11.8300
Tank Diameter (ft):	5.3300	5.3300	5.3300	5.3300	5.3300	5.3300	5.3300	5.3300	5.3300	5.3300	5.3300	5.3300
Working Loss Product Factor:	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total Losses (lb):	1.6241	1.8389	2.4497	3.3093	4.2194	4.9345	5.6481	5.3370	4.0616	3.2356	2.1841	1.7138

TANKS 4.0.9d
Emissions Report - Detail Format
Individual Tank Emission Totals

Emissions Report for: January, February, March, April, May, June, July, August, September, October, November, December

EU/EPN 17 - Vertical Fixed Roof Tank
Williston, North Dakota

	Losses(lbs)		
Components	Working Loss	Breathing Loss	Total Emissions
Methyl alcohol	25.25	15.30	40.56

GRI-GLYCalc VERSION 4.0 - AGGREGATE CALCULATIONS REPORT

Case Name: TAT-Blue Buttes 36 MMSCFD
File Name: P:\Clients\Targa\ND Baklenko\172401_0034 Tribal Registration\Updated GlyCalc, ProMax Files\New Promax, Glycalc, and Tank Runs\36 MMSCFd dehy v2.0.ddf
Date: May 02, 2018

DESCRIPTION:

Description: New Dehy no Condenser
Sample: Blue Buttes Compressor Dehy Inlet, sampled 2016-07-12
Provided by Targa 2018-05-02

Annual Hours of Operation: 8760.0 hours/yr

EMISSIONS REPORTS:

UNCONTROLLED REGENERATOR EMISSIONS

Component	lbs/hr	lbs/day	tons/yr
Methane	0.4182	10.037	1.8317
Ethane	1.0469	25.125	4.5852
Propane	1.8512	44.429	8.1084
Isobutane	0.3821	9.170	1.6736
n-Butane	1.5367	36.882	6.7309
Isopentane	0.3213	7.712	1.4075
n-Pentane	0.4734	11.361	2.0733
Cyclopentane	0.0758	1.819	0.3320
n-Hexane	0.1141	2.738	0.4998
Cyclohexane	0.0358	0.860	0.1570
Other Hexanes	0.1694	4.065	0.7419
Heptanes	0.2394	5.745	1.0485
Methylcyclohexane	0.0777	1.864	0.3402
Toluene	0.3516	8.439	1.5401
Xylenes	0.6836	16.406	2.9941
C8+ Heavies	0.5137	12.329	2.2500
Total Emissions	8.2909	198.982	36.3143
Total Hydrocarbon Emissions	8.2909	198.982	36.3143
Total VOC Emissions	6.8259	163.821	29.8973
Total HAP Emissions	1.1493	27.583	5.0339
Total BTEX Emissions	1.0352	24.845	4.5342

FLASH GAS EMISSIONS

Note: Flash Gas Emissions are zero with the Recycle/recompression control option.

FLASH TANK OFF GAS

Component	lbs/hr	lbs/day	tons/yr
Methane	80.6824	1936.378	353.3889
Ethane	50.7386	1217.727	222.2352

Propane	34.6424	831.417	151.7336
Isobutane	4.2448	101.874	18.5921
n-Butane	12.2426	293.822	53.6226
Isopentane	2.0750	49.799	9.0883
n-Pentane	2.3122	55.493	10.1275
Cyclopentane	0.1005	2.411	0.4400
n-Hexane	0.2762	6.629	1.2098
Cyclohexane	0.0226	0.542	0.0990
Other Hexanes	0.5693	13.662	2.4933
Heptanes	0.2529	6.069	1.1075
Methylcyclohexane	0.0345	0.829	0.1513
Toluene	0.0122	0.293	0.0534
Xylenes	0.0079	0.189	0.0346
C8+ Heavies	0.0875	2.099	0.3831
Total Emissions	188.3014	4519.234	824.7602
Total Hydrocarbon Emissions	188.3014	4519.234	824.7602
Total VOC Emissions	56.8804	1365.129	249.1361
Total HAP Emissions	0.2963	7.111	1.2978
Total BTEX Emissions	0.0201	0.482	0.0880

EQUIPMENT REPORTS:

ABSORBER

NOTE: Because the Calculated Absorber Stages was below the minimum allowed, GRI-GLYCalc has set the number of Absorber Stages to 1.25 and has calculated a revised Dry Gas Dew Point.

Calculated Absorber Stages:	1.25	
Calculated Dry Gas Dew Point:	3.84	lbs. H2O/MMSCF
Temperature:	91.4	deg. F
Pressure:	936.0	psig
Dry Gas Flow Rate:	36.0000	MMSCF/day
Glycol Losses with Dry Gas:	0.9373	lb/hr
Wet Gas Water Content:	Saturated	
Calculated Wet Gas Water Content:	48.19	lbs. H2O/MMSCF
Calculated Lean Glycol Recirc. Ratio:	2.61	gal/lb H2O

Component	Remaining in Dry Gas	Absorbed in Glycol
Water	7.95%	92.05%
Carbon Dioxide	99.89%	0.11%
Nitrogen	99.99%	0.01%
Methane	99.99%	0.01%
Ethane	99.98%	0.02%
Propane	99.97%	0.03%
Isobutane	99.96%	0.04%
n-Butane	99.95%	0.05%
Isopentane	99.95%	0.05%
n-Pentane	99.94%	0.06%
Cyclopentane	99.74%	0.26%
n-Hexane	99.92%	0.08%
Cyclohexane	99.61%	0.39%

Other Hexanes	99.93%	0.07%
Heptanes	99.86%	0.14%
Methylcyclohexane	99.62%	0.38%
Toluene	95.20%	4.80%
Xylenes	91.95%	8.05%
C8+ Heavies	99.79%	0.21%

FLASH TANK

Flash Control: Recycle/recompression
Flash Temperature: 75.0 deg. F
Flash Pressure: 100.0 psig

Component	Left in Glycol	Removed in Flash Gas
Water	99.92%	0.08%
Carbon Dioxide	8.58%	91.42%
Nitrogen	0.49%	99.51%
Methane	0.52%	99.48%
Ethane	2.02%	97.98%
Propane	5.07%	94.93%
Isobutane	8.26%	91.74%
n-Butane	11.15%	88.85%
Isopentane	13.50%	86.50%
n-Pentane	17.09%	82.91%
Cyclopentane	43.17%	56.83%
n-Hexane	29.34%	70.66%
Cyclohexane	62.18%	37.82%
Other Hexanes	23.13%	76.87%
Heptanes	48.74%	51.26%
Methylcyclohexane	70.04%	29.96%
Toluene	96.90%	3.10%
Xylenes	99.00%	1.00%
C8+ Heavies	86.42%	13.58%

REGENERATOR

No Stripping Gas used in regenerator.

Component	Remaining in Glycol	Distilled Overhead
Water	26.86%	73.14%
Carbon Dioxide	0.00%	100.00%
Nitrogen	0.00%	100.00%
Methane	0.00%	100.00%
Ethane	0.00%	100.00%
Propane	0.00%	100.00%
Isobutane	0.00%	100.00%
n-Butane	0.00%	100.00%
Isopentane	0.73%	99.27%
n-Pentane	0.70%	99.30%
Cyclopentane	0.66%	99.34%
n-Hexane	0.52%	99.48%
Cyclohexane	3.47%	96.53%
Other Hexanes	1.10%	98.90%
Heptanes	0.42%	99.58%

Methylcyclohexane	3.84%	96.16%
Toluene	7.87%	92.13%
Xylenes	12.83%	87.17%
C8+ Heavies	7.71%	92.29%

STREAM REPORTS:

WET GAS STREAM

Temperature: 91.40 deg. F
Pressure: 950.70 psia
Flow Rate: 1.50e+006 scfh

Component	Conc. (vol%)	Loading (lb/hr)
Water	1.02e-001	7.24e+001
Carbon Dioxide	7.89e-001	1.37e+003
Nitrogen	3.01e+000	3.33e+003
Methane	6.28e+001	3.98e+004
Ethane	2.00e+001	2.38e+004
Propane	9.17e+000	1.60e+004
Isobutane	8.53e-001	1.96e+003
n-Butane	2.42e+000	5.56e+003
Isopentane	3.46e-001	9.87e+002
n-Pentane	3.82e-001	1.09e+003
Cyclopentane	1.40e-002	3.88e+001
n-Hexane	4.10e-002	1.40e+002
Cyclohexane	3.00e-003	9.98e+000
Other Hexanes	8.29e-002	2.83e+002
Heptanes	3.75e-002	1.49e+002
Methylcyclohexane	4.99e-003	1.94e+001
Toluene	2.00e-003	7.29e+000
Xylenes	2.00e-003	8.39e+000
C8+ Heavies	2.20e-002	1.48e+002
Total Components	100.00	9.48e+004

DRY GAS STREAM

Temperature: 91.40 deg. F
Pressure: 950.70 psia
Flow Rate: 1.50e+006 scfh

Component	Conc. (vol%)	Loading (lb/hr)
Water	8.08e-003	5.75e+000
Carbon Dioxide	7.89e-001	1.37e+003
Nitrogen	3.01e+000	3.33e+003
Methane	6.28e+001	3.98e+004
Ethane	2.00e+001	2.38e+004
Propane	9.17e+000	1.60e+004
Isobutane	8.54e-001	1.96e+003
n-Butane	2.42e+000	5.55e+003
Isopentane	3.46e-001	9.86e+002
n-Pentane	3.82e-001	1.09e+003

Component	Conc. (wt%)	Loading (lb/hr)
Cyclopentane	1.40e-002	3.87e+001
n-Hexane	4.10e-002	1.40e+002
Cyclohexane	2.99e-003	9.94e+000
Other Hexanes	8.29e-002	2.83e+002
Heptanes	3.74e-002	1.48e+002
Methylcyclohexane	4.98e-003	1.93e+001
Toluene	1.90e-003	6.94e+000
Xylenes	1.84e-003	7.72e+000
C8+ Heavies	2.20e-002	1.48e+002
Total Components	100.00	9.47e+004

LEAN GLYCOL STREAM

Temperature: 91.40 deg. F
Flow Rate: 2.90e+000 gpm

Component	Conc. (wt%)	Loading (lb/hr)
TEG	9.85e+001	1.61e+003
Water	1.50e+000	2.45e+001
Carbon Dioxide	9.59e-012	1.57e-010
Nitrogen	2.11e-012	3.45e-011
Methane	7.00e-018	1.14e-016
Ethane	1.57e-007	2.56e-006
Propane	1.32e-008	2.15e-007
Isobutane	1.47e-009	2.40e-008
n-Butane	4.48e-009	7.31e-008
Isopentane	1.45e-004	2.37e-003
n-Pentane	2.03e-004	3.32e-003
Cyclopentane	3.10e-005	5.06e-004
n-Hexane	3.63e-005	5.93e-004
Cyclohexane	7.90e-005	1.29e-003
Other Hexanes	1.16e-004	1.89e-003
Heptanes	6.24e-005	1.02e-003
Methylcyclohexane	1.90e-004	3.10e-003
Toluene	1.84e-003	3.00e-002
Xylenes	6.17e-003	1.01e-001
C8+ Heavies	2.63e-003	4.29e-002
Total Components	100.00	1.63e+003

RICH GLYCOL AND PUMP GAS STREAM

Temperature: 91.40 deg. F
Pressure: 950.70 psia
Flow Rate: 3.49e+000 gpm
NOTE: Stream has more than one phase.

Component	Conc. (wt%)	Loading (lb/hr)
TEG	8.43e+001	1.61e+003
Water	4.79e+000	9.13e+001
Carbon Dioxide	2.23e-001	4.24e+000
Nitrogen	3.59e-001	6.84e+000
Methane	4.25e+000	8.11e+001
Ethane	2.72e+000	5.18e+001
Propane	1.91e+000	3.65e+001

Isobutane	2.43e-001	4.63e+000
n-Butane	7.23e-001	1.38e+001
Isopentane	1.26e-001	2.40e+000
n-Pentane	1.46e-001	2.79e+000
Cyclopentane	9.27e-003	1.77e-001
n-Hexane	2.05e-002	3.91e-001
Cyclohexane	3.13e-003	5.97e-002
Other Hexanes	3.88e-002	7.41e-001
Heptanes	2.59e-002	4.93e-001
Methylcyclohexane	6.05e-003	1.15e-001
Toluene	2.07e-002	3.94e-001
Xylenes	4.16e-002	7.92e-001
C8+ Heavies	3.38e-002	6.44e-001
Total Components	100.00	1.91e+003

FLASH TANK OFF GAS STREAM

Temperature: 75.00 deg. F
Pressure: 114.70 psia
Flow Rate: 3.11e+003 scfh

Component	Conc. (vol%)	Loading (lb/hr)
Water	4.64e-002	6.84e-002
Carbon Dioxide	1.08e+000	3.88e+000
Nitrogen	2.96e+000	6.81e+000
Methane	6.14e+001	8.07e+001
Ethane	2.06e+001	5.07e+001
Propane	9.58e+000	3.46e+001
Isobutane	8.91e-001	4.24e+000
n-Butane	2.57e+000	1.22e+001
Isopentane	3.51e-001	2.07e+000
n-Pentane	3.91e-001	2.31e+000
Cyclopentane	1.75e-002	1.00e-001
n-Hexane	3.91e-002	2.76e-001
Cyclohexane	3.27e-003	2.26e-002
Other Hexanes	8.06e-002	5.69e-001
Heptanes	3.08e-002	2.53e-001
Methylcyclohexane	4.29e-003	3.45e-002
Toluene	1.61e-003	1.22e-002
Xylenes	9.07e-004	7.89e-003
C8+ Heavies	6.26e-003	8.75e-002
Total Components	100.00	1.99e+002

FLASH TANK GLYCOL STREAM

Temperature: 75.00 deg. F
Flow Rate: 3.05e+000 gpm

Component	Conc. (wt%)	Loading (lb/hr)
TEG	9.41e+001	1.61e+003
Water	5.34e+000	9.12e+001
Carbon Dioxide	2.13e-002	3.64e-001
Nitrogen	1.94e-003	3.32e-002
Methane	2.45e-002	4.18e-001

Ethane	6.13e-002	1.05e+000
Propane	1.08e-001	1.85e+000
Isobutane	2.24e-002	3.82e-001
n-Butane	9.00e-002	1.54e+000
Isopentane	1.90e-002	3.24e-001
n-Pentane	2.79e-002	4.77e-001
Cyclopentane	4.47e-003	7.63e-002
n-Hexane	6.72e-003	1.15e-001
Cyclohexane	2.18e-003	3.71e-002
Other Hexanes	1.00e-002	1.71e-001
Heptanes	1.41e-002	2.40e-001
Methylcyclohexane	4.73e-003	8.08e-002
Toluene	2.24e-002	3.82e-001
Xylenes	4.59e-002	7.84e-001
C8+ Heavies	3.26e-002	5.57e-001
Total Components	100.00	1.71e+003

FLASH GAS EMISSIONS

Control Method: Recycle/recompression
Control Efficiency: 100.00

Note: Flash Gas Emissions are zero with the Recycle/recompression control option.

REGENERATOR OVERHEADS STREAM

Temperature: 212.00 deg. F
Pressure: 14.70 psia
Flow Rate: 1.47e+003 scfh

Component	Conc. (vol%)	Loading (lb/hr)
Water	9.54e+001	6.67e+001
Carbon Dioxide	2.13e-001	3.64e-001
Nitrogen	3.05e-002	3.32e-002
Methane	6.72e-001	4.18e-001
Ethane	8.97e-001	1.05e+000
Propane	1.08e+000	1.85e+000
Isobutane	1.69e-001	3.82e-001
n-Butane	6.81e-001	1.54e+000
Isopentane	1.15e-001	3.21e-001
n-Pentane	1.69e-001	4.73e-001
Cyclopentane	2.79e-002	7.58e-002
n-Hexane	3.41e-002	1.14e-001
Cyclohexane	1.10e-002	3.58e-002
Other Hexanes	5.06e-002	1.69e-001
Heptanes	6.16e-002	2.39e-001
Methylcyclohexane	2.04e-002	7.77e-002
Toluene	9.83e-002	3.52e-001
Xylenes	1.66e-001	6.84e-001
C8+ Heavies	7.77e-002	5.14e-001
Total Components	100.00	7.54e+001

APPENDIX C: VENDOR SPECIFICATION SHEETS

- EU 1 through EU 6 – Waukesha L5794GSI Compressor Engine Specification Sheet
- EU 1 through EU 6 – Bidell Catalytic Converter Specification Sheet
- EU 14 – LEED Fabrication Vapor Combustor Specification Sheet
- EU 27, EU 28 – Doosan/PSI 21.9L Generator Engine Specification Sheet
- EU 27, EU 28 – Engine Certificate of Conformity

GE Power

13-751 - Clarks Creek

Targa Badlands

VHP - L5794GSI

Gas Compression

ENGINE SPEED (rpm):	1200	NOx SELECTION (g/bhp-hr):	Customer Catalyst
DISPLACEMENT (in3):	5788	COOLING SYSTEM:	JW, IC + OC
COMPRESSION RATIO:	8.2:1	INTERCOOLER WATER INLET (°F):	130
IGNITION SYSTEM:	ESM	JACKET WATER OUTLET (°F):	180
EXHAUST MANIFOLD:	Water Cooled	JACKET WATER CAPACITY (gal):	107
COMBUSTION:	Rich Burn, Turbocharged	AUXILIARY WATER CAPACITY (gal):	11
ENGINE DRY WEIGHT (lbs):	24760	LUBE OIL CAPACITY (gal):	190
AIR/FUEL RATIO SETTING:	0.38% CO	MAX. EXHAUST BACKPRESSURE (in. H2O):	18
ENGINE SOUND LEVEL (dBA)	102	MAX. AIR INLET RESTRICTION (in. H2O):	15
		EXHAUST SOUND LEVEL (dBA)	111

SITE CONDITIONS:

FUEL:	Natural Gas	ALTITUDE (ft):	2500
FUEL PRESSURE RANGE (psig):	30 - 60	MAXIMUM INLET AIR TEMPERATURE (°F):	95
FUEL HHV (BTU/ft3):	1,035.2	FUEL WKI:	91.8
FUEL LHV (BTU/ft3):	935.8		

SITE SPECIFIC TECHNICAL DATA

POWER RATING	UNITS	110% OVERLOAD SITE DATA (See note 18)	MAX RATING AT 100 °F AIR TEMP	SITE RATING AT MAXIMUM INLET AIR TEMPERATURE OF 95 °F		
				100%	75%	55%
CONTINUOUS ENGINE POWER	BHP	1518	1380	1380	1035	763
OVERLOAD	% 2/24 hr	Note 18	10	10	-	-
MECHANICAL EFFICIENCY (LHV)	%	33.5	33.3	33.3	31.8	29.6
CONTINUOUS POWER AT FLYWHEEL	BHP	1518	1380	1380	1035	763
based on no auxiliary engine driven equipment						
FUEL CONSUMPTION						
FUEL CONSUMPTION (LHV)	BTU/BHP-hr	7597	7645	7645	8008	8616
FUEL CONSUMPTION (HHV)	BTU/BHP-hr	8404	8456	8456	8859	9531
FUEL FLOW *based on fuel analysis LHV*	SCFM	205	188	188	148	117
HEAT REJECTION						
JACKET WATER (JW)	BTU/hr x 1000	3308	3088	3074	2583	2161
LUBE OIL (OC)	BTU/hr x 1000	496	477	475	436	405
INTERCOOLER (IC)	BTU/hr x 1000	199	188	177	94	47
EXHAUST	BTU/hr x 1000	3245	2884	2896	2147	1635
RADIATION	BTU/hr x 1000	646	605	620	554	512
EMISSIONS (ENGINE OUT):						
NOx (NO + NO2)	g/bhp-hr	13.9	14.0	14.0	23.6	25.1
CO	g/bhp-hr	8.5	8.5	8.5	7.0	6.6
THC	g/bhp-hr	1.8	1.8	1.8	1.8	1.8
NMHC	g/bhp-hr	0.29	0.27	0.27	0.31	0.38
NM,NEHC (VOC)	g/bhp-hr	0.05	0.05	0.05	0.05	0.07
CO2	g/bhp-hr	471	473	473	496	534
CO2e	g/bhp-hr	514	514	514	542	590
CH2O	g/bhp-hr	0.05	0.05	0.05	0.05	0.05
CH4	g/bhp-hr	1.63	1.55	1.55	1.75	2.14
AIR INTAKE / EXHAUST GAS						
INDUCTION AIR FLOW	SCFM	2189	2003	2003	1588	1263
EXHAUST GAS MASS FLOW	lb/hr	9831	8993	8993	7133	5673
EXHAUST GAS FLOW *at exhaust temp, 14.5 psia*	ACFM	7078	6379	6379	4860	3754
EXHAUST TEMPERATURE	°F	1160	1136	1136	1073	1029

HEAT EXCHANGER SIZING[12]			
TOTAL JACKET WATER CIRCUIT (JW)	BTU/hr x 1000	3752	3502
TOTAL AUXILIARY WATER CIRCUIT (IC + OC)	BTU/hr x 1000	787	755

COOLING SYSTEM WITH ENGINE MOUNTED WATER PUMPS		
JACKET WATER PUMP MIN. DESIGN FLOW	GPM	450
JACKET WATER PUMP MAX. EXTERNAL RESTRICTION	psig	16
AUX WATER PUMP MIN. DESIGN FLOW	GPM	79
AUX WATER PUMP MAX. EXTERNAL RESTRICTION	psig	44

All data provided per the condtions listed in the notes section on page three.

Data Generated by EngCalc Program Version 3.6.Dresser Inc.

1/25/2017 3:25 PM

13-751 - Clarks Creek

Targa Badlands

VHP - L5794GSI

Gas Compression

FUEL COMPOSITION

HYDROCARBONS:		Mole or Volume %
Methane	CH4	93
Ethane	C2H6	4
Propane	C3H8	1
Iso-Butane	I-C4H10	0
Normal Butane	N-C4H10	0
Iso-Pentane	I-C5H12	0
Normal Pentane	N-C5H12	0
Hexane	C6H14	0
Heptane	C7H16	0
Ethene	C2H4	0
Propene	C3H6	0
	SUM HYDROCARBONS	98
NON-HYDROCARBONS:		
Nitrogen	N2	0
Oxygen	O2	0
Helium	He	0
Carbon Dioxide	CO2	2
Carbon Monoxide	CO	0
Hydrogen	H2	0
Water Vapor	H2O	0
	TOTAL FUEL	100

FUEL:	Natural Gas
FUEL PRESSURE RANGE (psig):	30 - 60
FUEL WKI:	91.8
FUEL SLHV (BTU/ft3):	919.50
FUEL SLHV (MJ/Nm3):	36.16
FUEL LHV (BTU/ft3):	935.78
FUEL LHV (MJ/Nm3):	36.80
FUEL HHV (BTU/ft3):	1035.15
FUEL HHV (MJ/Nm3):	40.71
FUEL DENSITY (SG):	0.60

Standard Conditions per ASTM D3588-91 [60°F and 14.696psia] and ISO 6976:1996-02-01[25, V(0;101.325)].
Based on the fuel composition, supply pressure and temperature, liquid hydrocarbons may be present in the fuel. No liquid hydrocarbons are allowed in the fuel. The fuel must not contain any liquid water. Waukesha recommends both of the following:
1) Dew point of the fuel gas to be at least 20°F (11°C) below the measured temperature of the gas at the inlet of the engine fuel regulator.
2) A fuel filter separator to be used on all fuels except commercial quality natural gas.
Refer to the 'Fuel and Lubrication' section of 'Technical Data' or contact the Waukesha Application Engineering Department for additional information on fuels, or LHV and WKI* calculations.
* Trademark of General Electric Company

FUEL CONTAMINANTS

Total Sulfur Compounds	0	% volume
Total Halogen as Cloride	0	% volume
Total Ammonia	0	% volume
Siloxanes		
Tetramethyl silane	0	% volume
Trimethyl silanol	0	% volume
Hexamethyldisiloxane (L2)	0	% volume
Hexamethylcyclotrisiloxane (D3)	0	% volume
Octamethyltrisiloxane (L3)	0	% volume
Octamethylcyclotetrasiloxane (D4)	0	% volume
Decamethyltetrasiloxane (L4)	0	% volume
Decamethylcyclopentasiloxane (D5)	0	% volume
Dodecamethylpentasiloxane (L5)	0	% volume
Dodecamethylcyclohexasiloxane (D6)	0	% volume
Others	0	% volume

Total Sulfur Compounds	0 µg/BTU
Total Halogen as Cloride	0 µg/BTU
Total Ammonia	0 µg/BTU
Total Siloxanes (as Si)	0 µg/BTU

Calculated fuel contaminant analysis will depend on the entered fuel composition and selected engine model.

NOTES

1. All data is based on engines with standard configurations unless noted otherwise.
2. Power rating is adjusted for fuel, site altitude, and site air inlet temperature, in accordance with ISO 3046/1 with tolerance of ± 3%.
3. Fuel consumption is presented in accordance with ISO 3046/1 with a tolerance of -0 / +5% at maximum rating. Fuel flow calculation based on fuel LHV and fuel consumption with a tolerance of -0/+5 %. For sizing piping and fuel equipment, it is recommended to include the 5% tolerance.
4. Heat rejection tolerances are ± 30% for radiation, and ± 8% for jacket water, lube oil, intercooler, and exhaust energy.
5. Emission levels for engines with GE supplied 3-way catalyst are given at catalyst outlet flange. For all other engine models, emission levels are given at engine exhaust outlet flange prior to any after treatment. Values are based on a new engine operating at indicated site conditions, and adjusted to the specified timing and air/fuel ratio at rated load. Catalyst out emission levels represent emission levels the catalyst is sized to achieve. Manual adjustment may be necessary to achieve compliance as catalyst/engine age. Catalyst-out emission levels are valid for the duration of the engine warranty. Emissions are at an absolute humidity of 75 grains H2O/lb (10.71 g H2O/kg) of dry air. Emission levels may vary subject to instrumentation, measurement, ambient conditions, fuel quality, and engine variation. Engine may require adjustment on-site to meet emission values, which may affect engine performance and heat output. NOx, CO, THC, and NMHC emission levels are listed as a not to exceed limit, all other emission levels are estimated. CO2 emissions based on EPA Federal Register/Vol. 74, No. 209/Friday, October 30, 2009 Rules and Regulations 56398, 56399 (3) Tier 3 Calculation Methodology, Equation C-5.
6. Air flow is based on undried air with a tolerance of ± 7%.
7. Exhaust temperature given at engine exhaust outlet flange with a tolerance of ± 50°F (28°C).
8. Exhaust gas mass flow value is based on a "wet basis" with a tolerance of ± 7%.
9. Inlet air restrictions based on full rated engine load. Exhaust backpressure based on 158 PSI BMEP and 1200 RPM. Refer to the engine specification section of Waukesha's standard technical data for more information.
10. Cooling circuit capacity, lube oil capacity, and engine dry weight values are typical.
11. Fuel must conform to Waukesha's "Gaseous Fuel Specification" S7884-7 or most current version. Fuel may require treatment to meet current fuel specification.
12. Heat exchanger sizing values given as the maximum heat rejection of the circuit, with applied tolerances and an additional 5% reserve factor.
13. Fuel volume flow calculation in english units is based on 100% relative humidity of the fuel gas at standard conditions of 60°F and 14.696 psia (29.92 inches of mercury; 101.325 kPa).
14. Fuel volume flow calculation in metric units is based on 100% relative humidity of the fuel gas at a combustion temperature of 25°C and metering conditions of 0°C and 101.325 kPa (14.696 psia; 29.92 inches of mercury). This is expressed as [25, V(0;101.325)].
15. Engine sound data taken with the microphone at 1 m (3.3 ft) from the side of the engine at the approximate front-to-back centerline. Microphone height was at intake manifold level. Engine sound pressure data may be different at front, back and opposite side locations. Exhaust sound data taken with microphone 1 meter (3.3 ft) away and 1 meter (3.3 ft) to the side of the exhaust outlet.
16. Due to variation between test conditions and final site conditions, such as exhaust configuration and background sound level, sound pressure levels under site conditions may be different than those tabulated above.
17. Cooling system design flow is based on minimum allowable cooling system flow. Cooling system maximum external restriction is defined as the allowable restriction at the minimum cooling system flow.
18. Continuous Power Rating: The highest load and speed that can be applied 24 hours per day, seven days per week, 365 days per year except for normal maintenance at indicated ambient reference conditions and fuel. It is permissible to operate the engine at the indicated overload power, for two hours in every 24 hour period.
19. emPact emission compliance available for entire range of operable fuels; however, fuel system and/or O2 set point may need to be adjusted in order to maintain compliance.
20. In cold ambient temperatures, heating of the engine jacket water, lube oil and combustion air may be required. See Waukesha Technical Data.

SPECIAL REQUIREMENTS

May 25, 2016

Emission Control Application Data Sheet

Maxim Silencers
10635 Brighton Lane
Stafford, Texas 77477
Phone: 832 554-0980
Fax: 832 554-0990

Customer: **BIDELL** Project: **NORTH DAKOTA - GE VHP L5795GSI** Date: **1/26/2017**

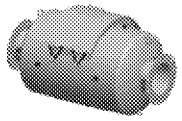
Customer Contact **STEVE WATSON** Maxim Contact: **AARON HUFF / ROBERT GASIENICA** Order/Quote #: **Q01154AH**

Engine Data:

Engine Model:	**Waukesha L5794GSI**		Speed:	**1200**	RPM
Fuel & Operating Type:	**Natural Gas Rich Burn**		Engine Power:	**1380**	Hp
				1029	KW
Exhaust Flow Rate:	**6379**	**acfm**	Exhaust Temperature:	**1136**	°F
	10838	**m^3/hr**		**613**	°C
	9497	**lbs/hr**			

Catalyst Data:

Number of Core layers:	**1**				
Model:	**QAC6-53-14**		Inlet Size:	**14**	in
Grade:	**Hospital Plus**		Outlet Size:	**14**	in
Body Diameter:	**40**	in	Body Length:	**141**	in
Estimated weight:	**1374**	lbs	Estimated Back Pressure of the unit:	**7.21**	in of WC
	623	Kg		**18.0**	mbar
Core Part Number:	**PE2-530**	Qty **1**	Speed through inlet:	**6176**	ft/min
Cell Density	300	cpsi	Back Pressure across Element(s) only	2.87	in of WC
				7.2	mbar



Emission:

Min. Temp. at Core Face: **1112** °F **600** °C
Max. Temp. at Core Face: **1239** °F **671** °C

Catalyst Type: **3-Way**

O_2 in Exhaust vol %
H_2O in Exhaust vol %

	Pollutant					
	NOx	CO	NMHC/VOC	CH_2O/CHCO	ORGANIC PM10	
Engine Out / Pre Emission:	**14**	**8.5**	**0.05**	**0.05**	**0**	g/bhp-hr
	5275.52	**3203.00**	**18.84**	**18.84**	**0.00**	mg/Nm3
Post Emission:	**0.910**	**0.217**	**0.009**	**0.003**	**0.000**	g/bhp-hr
	342.91	**81.72**	**3.26**	**1.15**	**0.00**	mg/Nm3
	93.5	***97.4***	***82.7***	***93.9***	***50.0***	% Reduction
	2.77	0.66	0.03	0.01		lb/hr
	12.13	2.89	0.12	0.04		tons/year operation **8760** hr/year
	197.8	47.1	1.9	0.7		ppmv
						ppmvd @ 15% O2

Acoustics:

Frequency Band (Hz):	31.5	63	125	250	500	1000	2000	4000	8000	
Raw Noise SPL (dB) at 3.28 ft.:	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	7 dBA
Estimated Attenuation (dB):	**10**	**21**	**45**	**42**	**38**	**39**	**40**	**40**	**40**	No Element
Plus:	**10**	**22**	**47**	**44**	**42**	**44**	**46**	**46**	**45**	One Element Layer
Silenced SPL (dB) at 3.28 ft.:	**-10**	**-22**	**-47**	**-44**	**-42**	**-44**	**-46**	**-46**	**-45**	-37.2 dBA

Warranty & Notes:

- **If Pre-Emission levels are not as noted above, contact Maxim Silencers for a re-quote.**
- To achieve Post Emissions levels detailed above, exhaust temperature and Pre-Emission data must be as specified.
- Maximum allowable exhaust temperature at core face is 1350°F.
- If applicable, the engine will require an air/fuel ratio controller to meet above emission levels. For Rich Burn engines λ must be 0.96 - 0.99.
- Catalyst cleaning/regeneration required, if initial backpressure increases by 2" of WC.
- Engine operation to be stable and reproducible.
- QAC is not designed to withstand a backfire, therefore measures should be taken prior to QAC unit to alleviate backfire pressure.
- Maximum lubrication oil consumption rate to be less than 0.0015 lb/bhp/hr.
- Lube oil sulfate ash contents should not exceed 0.5%.
- Phosphorus and/or Zinc should not exceed 5 ppmv in the exhaust stream.
- A high temperature alarm/shutdown to be maintained at downstream of catalyst at 1300°F.
- Fuel not to contain heavy or transition metals such as Pb, Ar, Zn, Cu, Sn, Fe, Ba, Ni, Cr etc.
- Chlorinated or Silicone containing compounds in the exhaust not to exceed 1 ppmv.
- Sulfur compounds in the exhaust gas stream not to exceed 25 ppmv.
- Performance guarantee is voided should the catalyst become masked or de-activated by any contaminant in the exhaust stream.
- Engine to be maintained and operated in accordance within manufacturer's recommended practice.
- Under no condition will Maxim Silencers assume any contingent liabilities.
- Operating manual is available online at www.maximsilencers.com or contact a Maxim sales representative.
- Nomenclature: QAC4-292-8, 4 is grade (Super Critical), 29 is catalyst block size, 2 is no. of catalyst(s) and 8 is flange diameter.
- Organic PM10 are estimate only and not a guarantee because of the variability in fuels and additives which change PM10.
- Maxim's standard one year warranty applies.

Rev level: 86

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		Project No.:		Revision:	B		
		Project:		Date:	27 February 2014		
	Enviromental Control Equipment			By:	JS		
	Data Sheet	P.O. No.:	-	Checked:	SG		
		RFQ No.:	-	Approved:	MS		

	Client:		Ref. P&ID:	-	
	Site:			Supplier:	LEED FABRICATION
	Unit/Lease:		Remarks:	-	Model No.: L30-0011-00

GENERAL

1	Design Code:		NDE:	LEED Fabrication Standards
2	Service:		Customer Specs:	☐ Yes
3	Description:	Standard Dual Stage 48 High Efficiency Combustor		☑ No

PROCESS DATA

	Gas Composition:	mol %	Process Conditions: Variable	Value	Units
4	Methane		Flow Rate	Up to 140	Mscfd
5	Ethane		Pressure	Up to 12	oz/in2
6	Propane		Temperature		°F
7	I-Butane		Molecular Weight		
8	n-Butane		Process/Waste Stream	☑ Gas	☐ Liquid
9	I-Pentane		Detailed Process Description / Process Notes:		
10	n-Pentane		1. Turndown 10:1. Based on an expected normal operating rate indicated above.		
11	n-Hexane		2. DRE: 98 % operating at design conditions		
12	CO2		3. Burner Pressure Drop: Min. 0.10 oz/in2		
13	N2				
14	Helium				
15	H_2O				
16	C7				
17	C8				
18	C9				
19	C10				
20	C11+				
21	TOTAL				

	Other Components:	PPMV	Available Utilities:	
22	H2S		Fuel / Pilot Gas	Min. 30psig Natural Gas / Propane 40-50 SCFH
23	Benzene		Instrument Air	NA
24	Toluene		Power	120 V / 60 Hz or Solar Power
25	E-Benzene		Steam	NA
26	Xylene		Purge Gas	

DESIGN DATA

27	Ambient Temperatures:		Noise Performance Requirements:	Under 85 dBA
28	Low, °F	-20	Structural Design Code:	
29	High, °F	120	Wind Design Code:	ASCE
30	Design Conditions: Pressure/Temperature			
31	Max. Relative Humidity, %	90	Pressure/Speed	100 mph
32	Elevation (ASL), ft		Category	
33	Area Classification:	Class I Div 2	Seismic Design Code:	
34	Electrical Design Code:	NEC	Location	

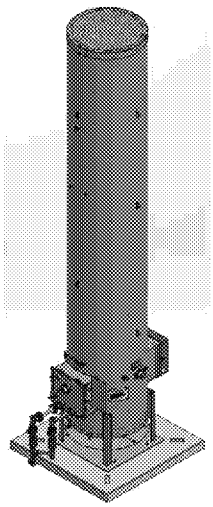
EQUIPMENT SPECIFICATION

35	Type:	☐ Elevated	☑ Enclosed		Equipment Design:		
36		☐ Above Ground			Component	Material / Size / Rating / Other	
37		☑ Stack	☐ Multiple Stack		Burner		
38		☐ Portable / Trailer			Burner Tip / Assist Gas Burner	304 SS	
39					Burner Body	Carbon Steel	
40	Smokeless By:	☐ Steam	☐ Assist Air		Pilot		
41		☐ Gas Assist	☑ Staging		Pilot Tip	304 SS	
42					Pilot Line(s)	Carbon Steel	
43	Stack:	☑ Self Supporting			Firebox / Stack		
44	Flare Burner:	☐ Non-Smokeless	☑ Smokeless	☐ Gas Assist	Shell	Carbon Steel	
45	Pilot:	☑ Intermittent	☐ Continuous		Piping	Carbon Steel	
46	Pilot Air Inspirator:	☑ Local	☐ Remote		Nozzles	Carbon Steel	
47	Pilot Flame Control:	☐ No	☑ Yes (Thermocouple)		Flanges	Carbon Steel	
48					Insulation	Blanket	
49	Pilot Ignition:	☐ Flamefront Generator	☑ Inspirating Ignitor		Insulation Pins	304 SS	
50		☐ Electronic	☑ Automatic	☐ Manual	Refractory	NA	
51		☐ With Pilot Flame Control			Refractory Anchors	NA	
52		☐ With Auto Pilot Re-Ignition			Ladders and Platforms	NA	
53					Stack Sample Connections	Per EPA requirements	
54	Pilot Ignition Backup:	☐ Manual	Specify: i.e Piezo-Electric		Sight Glass	2	
55		☐ Battery Pack			Other		

		Item/Tag No.:		Page	2	of	3
		Project No.:		Revision:	B		
		Project:		Date:	27 February 2014		
	Environmental Control Equipment			By:	JS		
	Data Sheet	P.O. No.:	-	Checked:	SG		
		RFQ No.:	-	Approved:	MS		

	Client:		Ref. P&ID:	-	
	Site:			Supplier:	LEED FABRICATION
	Unit/Lease:		Remarks:	-	Model No.: L30-0011-00

EQUIPMENT SPECIFICATION

56	**Flame Detection:**	☐ Thermocouple	☑ Ionization Rod	**Auxiliary Equipment**	
57		☐ UV Scanner		Valves	NA
58	**General Configuration:**			Blowers	NA
59				Dampers	NA
60				Inlet KO / Liquid Seal	NA
61				Flame / Detonation Arrestor	Yes
62				**Instrumentation & Controls**	
63				Solenoids / Shut-Off Valves	Check with Sales for available config.
64				Flow Meters	NA
65				Calorimeter	NA
66				Pressure Switches/Transmitters	NA
67				Thermocouples	Check with Sales for available config.
68				Temperature Switches/Transmitters	NA
69				BMS	Check with Sales for available config.
70				CEMS	NA
71				Other	NA
72					
73					
74					
75					

FABRICATION AND INSPECTION

76	**Special requirements**	☐ Skid Mounted	☑ Concrete Pad	**Equipment Info**	
77		☐ Other		**Component**	**Weight / Dimensions**
78				**Burner**	
79	**Inspection**	☑ Vendor Standard		Burner Assembly	
80		☐ Other. Specify:		**Stack**	
81	**Material Certification**	☑ Vendor Standard		Stack Assembly	48 " OD x 25 ' H
82		☐ MTR		Pilot Tip	
83		☐ Certificate of Compliance		Pilot Line(s)	
84		☐ Other (Specify):		Stack Assembly	
85	**NDE**	☑ Vendor Standard		**Auxiliary Equipment**	
86		☐ Radiography. Specify:		Blowers	
87		☐ Ultrasonic. Specify:		Inlet KO / Liquid Seal	
88		☐ Liquid Penetrant.		Flame / Detonation Arrestor	
89		☐ Magnetic Particles.		Skid	
90		☐ PMI. Specify:		**Instrumentation & Controls**	
91		☐ Other. Specify:		BMS	
92	**Surface Preparation**	☑ Vendor Standard		Control Panel	
93		☐ Other. Specify:			
94	**Paint System**	☑ Vendor Standard			
95		☐ Other. Specify:			
96	**Finished Color**	☑ Vendor Standard			
97		☐ Other. Specify:			
98					
99					

Additional Notes:

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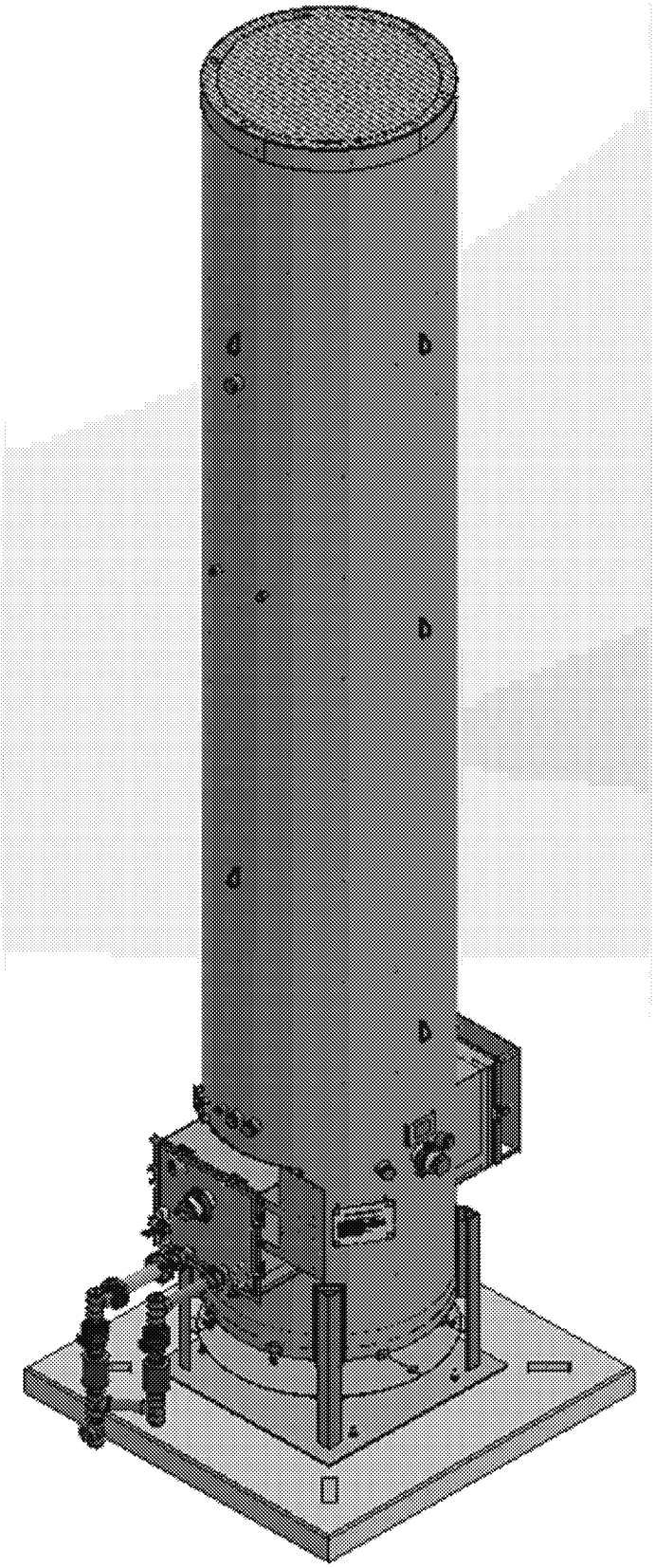
		Project No.:		Revision:	8		
		Project:		Date:	27 February 2014		
				By:	JS		
Environmental Control Equipment Data Sheet		P.O. No.:	-	Checked:	SG		
		RFQ No.:	-	Approved:	MS		
Client:		Ref. P&ID:	-				
Site:				Supplier:	LEED FABRICATION		
Unit/Lease:		Remarks:	-	Model No.:	L30-0011-00		

GENERAL ARRANGEMENT



DOOSAN / PSI

21.9L

	Rev:	A				
	Units		21.9L			
	Std	Metric	1500		1800	
General Engine Data						
Type	N/A		V-type 4 cycle			
Number of cylinders	N/A		12			
Aspiration	N/A		Turbo Charge Air Cooled			
Bore	in	mm	5.04	128	5.04	128
Stroke	in	mm	5.59	142	5.59	142
Displacement	in^3	L	1338	21.9	1338	21.9
Compression Ratio	N/A		10.5			
Mean Piston Speed	ft/min	m/s	1398	7.1	1677	8.52
Gross Standby Power Rating[1,2,3] Per ISO 3046 at the Flywheel						
NG	Hp	kW	507	378	612	456
LP	Hp	kW	370	276	471	351
MEP (@ rated Load on NG)	psi	bar	200	13.8	201	13.9
MEP (@ rated Load on LP)	psi	bar	146	10.1	155	10.7
Gross Prime Power Rating[1,2,3] Per ISO 3046 at the Flywheel						
NG	Hp	kW	469	350	550	410
LP	Hp	kW	N/A	N/A	N/A	N/A
MEP (@ rated Load on NG)	psi	bar	185	12.8	181	12.5
MEP (@ rated Load on LP)	psi	bar	N/A	N/A	N/A	N/A
RPM Range (Min-Max)	RPM		1500-1800			
Rotation Viewed from Flywheel	N/A		Counter Clockwise			
Firing Order	N/A		1-12-5-8-3-10-6-7-2-11-4-9			
Dry Weight						
Fan to Flywheel	lb	kg	3638	1650	3638	1650
Rad to Flywheel	lb	kg	5238	2376	5238	2376
Wet Weight						
Fan to Flywheel	lb	kg	3813	1706	3813	1706
Rad to Flywheel	lb	kg	5760	2620	5760	2620
CG						
Distance from FW housing	in	mm	24	602	24	602
Distance above center of crankshaft	in	mm	7	182	7	182
Engine Mounting						
Maximum Allowable Bending Moment at Rear of Block	lb ft	N m	4425	6000	4425	6000
Moment of Inertia About Roll Axis	lb ft^2	kg m^2				
Flywheel housing	N/A		SAE No.1			
Flywheel	N/A		No. 14			
Number of Flywheel Teeth	N/A		160			
Exhaust System						
Type			Water Cooled Manifold			
Maximum allowable Back pressure	in HG	kPa	3	10.2	3	10.2
Standard Catalyst Back pressure	in HG	kPa	1.5	5.1	1.5	5.1
Exhaust Outlet Pipe Size						
Maximum Turbine Inlet Temperature	F	C	1382	750	1382	750
Exhaust Flow at Rated Power	lb/hr	kg/hr	3184	1444	4038	1832
Exhaust Flow at Rated Power @1350F	cfm	m^3/min	2427	68.7	2995	84.8
Air Induction System						
Maximum allowable Intake Air Restriction with Air Cleaner						
Clean	inH2O	kPa	5	1.24	5	1.24
Dirty	inH2O	kPa	15	3.74	15	3.74
Combustion Air required (entire engine)	lb/hr	kg/hr	3004	1362	3810	1728
Combustion Air required (entire engine)	cfm	m^3/min	763	22	968	27

	Rev:	A				
	Units		21.9L			
	Std	Metric	1500		1800	
Electrical System						
Minimum Recommended Battery Capacity	AH		200			
Cold Cranking Current						
Engine only	CCA		1000			
Engine with Drive train	CCA		1000			
Maximum Allowable Resistance of Starting Circuit	Ohms		0.002			
Starting Motor Power	HP	kW	9.4	7	9.4	7
Battery Charging Alternator						
Voltage	Volts		24			
Current	Amps		45			
Coil primary Resistance	Ohms		0.59Ω ± 10%			
Spark Plug p/n			IFR7F-4D			
Spark plug gap	inches	mm	.015" (-0/+.008") .38mm (-0/+.2mm)			
Cooling System						
Coolant Capacity						
Engine only	gal	L	11.5	52.3	11.5	52.3
Engine with Radiator	gal	L	50.1	228	50.1	228
Engine Coolant Flow	gal/min	L/min	145	550	174	660
Water Pump Speed	RPM		2547		3056	
Heat rejected to Cooling water at rated Load	btu/min	kcal/sec	21451	90.1	25760	108.2
Maximum Intake Air Temperature (IAT)	F	C	155	68	155	68
ECU IAT Warning	F	C	140	60	140	60
ECU IAT Shutdown	F	C	155	69	155	69
Maximum Coolant Friction Head External to the engine	psi	bar	5.8	0.4	5.8	0.4
Maximum Air Restriction Across a Radiator	inH2O	mmH2O	0.5	12.8	0.5	12.8
Standard Thermostat Range						
Cracking Temperature	F	C	160	71	160	71
Full Open Temperature	F	C	185	85	185	85
Maximum Allowable Pressure Cap	psi	bar	14.7	1	14.7	1
Ambient Clearance Open Genset (water) (Air-to-Boil)						
Specified	F	C	142	61	142	61
Acutal	F	C			142	61
Ambient Clearance (Oil)						
Specified	F	C	142	61	142	61
Acutal	F	C			144	62
CAC Rise over Ambient (Charge)						
Specified	F	C	15	9	15	9
Acutal	F	C			11	6
Maximum Allowable Top Tank Temperature	F	C	230	110	230	110
ECU Warning	F	C	220	104	220	104
ECU Shutdown	F	C	230	110	230	110
Fan Power	HP	kW	24	17.9	42	31.3
Fan Diameter, including blades	in	mm	52	1321	52	1321
Fan Speed	RPM		1200		1440	
Cooling Fan Air Flow @ 1" Static H2O Pressure and 125F @ radiator	CFM	m^3/min	34,286	971	40,000	1,133
Charge Air Cooler						
Compressor Outlet Temperature	F	C	246	120	300	150
Compressor Flow Rate per CAC	lb/hr	kg/hr	1592	722	2019	916
Heat Rejection per CAC	btu/min	kW	TBD		3040	53.5

DOOSAN / PSI

21.9L

	Rev:	A				
	Units		21.9L			
	Std	Metric	1500		1800	
Lubrication System						
Oil Specification			SAE 15W-40 Low Ash Gas engine oil (.25-.5% by wt), API CD/CF or higher			
Oil Pressure						
Idle						
Min	Psi	Bar	13	0.9	13	0.9
Max	Psi	Bar	43.5	3	43.5	3
Rated Speed						
Min	Psi	Bar	43.5	3	43.5	3
Max	Psi	Bar	94.5	6.5	94.5	6.5
Maximum Allowable Oil Temperature	F	C	250	121	250	121
Engine Oil Capacity						
Min	Qts	L	34.75	33	34.75	33
Max	Qts	L	42.25	40	42.25	40
Oil Filter Capacity	Qts	L	7.5	7.1	7.5	7.1
ECU Oil Pressure Warning[5]	psi		30			
ECU Oil Pressure Shut Down[5]	psi		25			
Fuel System						
Fuel Consumption[6]						
NG	Ft^3/hr	kg/hr	3779	86	4230	96
LP	Ft^3/hr	kg/hr	1186	63	1408	75
Maximum EPR Rated Pressure	psi	kPa	1.0	6.9	1.0	6.9
Maximum Running pressure to Electronic Pressure Regulator (EPR)	inH2O	kPa	11.0	2.7	11.0	2.7
Minimum Running pressure to EPR	inH2O	kPa	7.0	1.7	7.0	1.7
Minimum Gas Supply Pipe Size			2 x 2" NPT			
Maximum EPR Rated Pressure	psi	kPa	1.0	6.9	1.0	6.9
Maximum Running Pressure to EPR	inH2O	kPa	11.0	2.7	11.0	2.7
Minimum Running Pressure to EPR	inH2O	kPa	7.0	1.7	7.0	1.7
Minimum LPG Supply Pipe Size[4]			2 x 2" NPT			

[1] Standby and overload ratings based on ISO3046.

[2] All ratings are gross flywheel horsepower corrected to 77°F at an altitude of 328feet with no cooling fan or alternator losses using heating value for NG of 1015 BTU/SCF.

[3] Production tolerances in engines and installed components can account for power variations of +/- 5%. Altitude, temperature and excessive exhaust and intake restrictions should be applied to power calculations.

[4] The preceeding pipe sizes are only suggestions and piping sizes may vary with temperature, pressure, distance from supply and application of local codes. Gas must be available at adequate volume and pressure for engine at the EPR.

[5] >1400RPM

[6] See PSI HD Technical Spec. 56300002 - Fuel Specification

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
2015 MODEL YEAR
CERTIFICATE OF CONFORMITY
WITH THE CLEAN AIR ACT

OFFICE OF TRANSPORTATION AND AIR QUALITY
ANN ARBOR, MICHIGAN 48105

Certificate Issued To: **Power Solutions International, Inc.**
(U.S. Manufacturer or Importer)

Certificate Number: **FPSIB21.9NGP-018**

Effective Date: 11/12/2014

Expiration Date: 12/31/2015

Byron J. Bunker, Division Director
Compliance Division

Issue Date: 11/12/2014

Revision Date: N/A

Manufacturer: Power Solutions International, Inc.
Engine Family: FPSIB21.9NGP
Certification Type: Mobile and Stationary
Fuel : Natural Gas (CNG/LNG)
LPG/Propane
Emission Standards : NMHC + NOx (g/kW-hr) : 2.7
HC + NOx (g/kW-hr) : 2.7
CO (g/kW-hr) : 4.4CO (g/Hp-hr) : 2
NOx (g/Hp-hr) : 1
VOC (g/Hp-hr) : 0.7
Emergency Use Only : N

Pursuant to Section 213 of the Clean Air Act (42 U.S.C. section 7547) and 40 CFR Part 1048, 40 CFR Part 60, 1065, 1068, and 60 (stationary only and combined stationary and mobile) and subject to the terms and conditions prescribed in those provisions, this certificate of conformity is hereby issued with respect to the test engines which have been found to conform to applicable requirements and which represent the following nonroad engines, by engine family, more fully described in the documentation required by 40 CFR Part 1048, 40 CFR Part 60 and produced in the stated model year.

This certificate of conformity covers only those new nonroad spark-ignition engines which conform in all material respects to the design specifications that applied to those engines described in the documentation required by 40 CFR Part 1048, 40 CFR Part 60 and which are produced during the model year stated on this certificate of the said manufacturer, as defined in 40 CFR Part 1048, 40 CFR Part 60. This certificate of conformity does not cover nonroad engines imported prior to the effective date of the certificate.

It is a term of this certificate that the manufacturer shall consent to all inspections described in 40 CFR 1068.20 and authorized in a warrant or court order. Failure to comply with the requirements of such a warrant or court order may lead to revocation or suspension of this certificate for reasons specified in 40 CFR Part 1048, 40 CFR Part 60. It is also a term of this certificate that this certificate may be revoked or suspended or rendered void *ab initio* for other reasons specified in 40 CFR Part 1048, 40 CFR Part 60.

This certificate does not cover large nonroad engines sold, offered for sale, or introduced, or delivered for introduction, into commerce in the U.S. prior to the effective date of the certificate.